BRASS WORLD
AND
PLATING — POLISHING — FINISHING

A Monthly Publication Relating to the Arts of Refining, Alloying, Casting, Rolling, Plating, Polishing and Finishing of the Non-Ferrous Metals and Their Alloys

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Detroit, the Platers' Convention City

The 17th Annual Convention of the American Electroplaters' Society to Be Held July 8-11. Advance Information About Program and Description of Plating Industry of Detroit

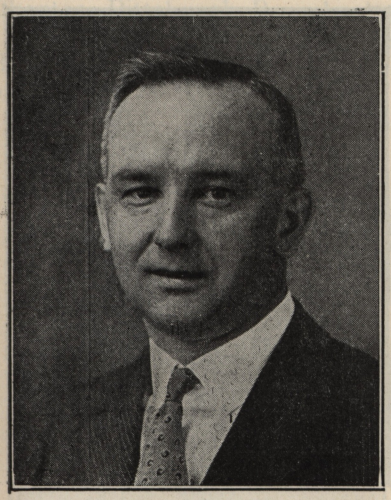
THE American Electroplaters' Society last year chose Detroit, Mich., as the convention city for 1929. The sessions will be held at the Statler Hotel from July 8 to 11 inclusive.

Detroit is one of the most important electroplating cities of the Middle West. It is the leader in American automobile production, and as the automobile industry makes extraordinary demands upon plating for its beauty of finish, Detroit has naturally taken the lead in plating work. The Packard Motor Company, the Chrysler plant, Graham-Paige, Chevrolet, Cadillac, Dodge Brothers and Buick, all have extensive electroplating plants. In addition there are many large jobbing plants doing work for automobile manufacturers. The Ternstedt Manufacturing Company has probably the largest of these but there are many other organizations of considerable size, such as the McCord Radiator Company, Motor City Plating Company, Joseph Robinson Plating Company, Bromley Plating Company, Hall Lamp Company, Apex Plating Company, George Rabb, Evaco Industries and General Chromium Corporation.

Plans for the Convention

The members of the Detroit Branch Convention Committee have long and faithfully made their preparations for this convention. A full program has been arranged of educational features and entertainments, including visits to plants. The heads of the various committees are as follows:

Officers of the American Electroplaters' Society



HORACE H. SMITH
Newark Branch
President

C. A. VAN DERAU
Dayton Branch
First Vice-President

W. J. R. KENNEDY
Hartford, Conn., Valley Branch
Second Vice-President

E. V. Allen, president Detroit Branch and Ex-officio member of all committees.

Charles Mascola, vice-president Detroit Branch.

Charles Phillips, secretary-treasurer.

E. G. Lovering, general chairman Convention Committee.

T. C. Eichstaedt, chairman Committee on General Information.

H. E. Wagner, chairman Program Committee.

H. J. Jameson, chairman Educational Committee.

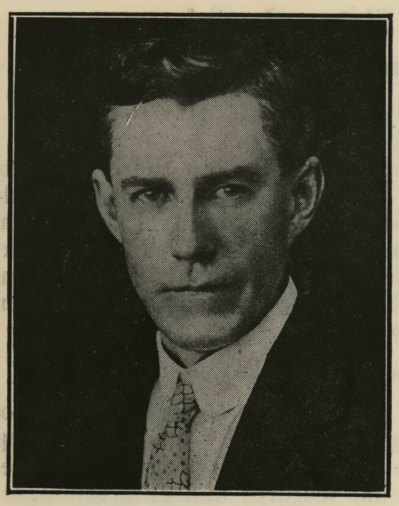
Charles Marker, chairman Exhibits Committee.

William McCord, chairman Entertainment Committee.

Among the members of these committees are **John Schultz, J. C. Robinson, W. T. Patterson, Art Suttcliff, A. E. Shepard, Al Barrows** and **R. E. Mitter.**

Hotel accommodations are obtainable at the Statler Hotel, the headquarters of the convention, from $3.00 per day for a single room and $5.00 per day for a double room, upward. There are many other hotels, however, within a stone's throw of the Statler with rates ranging from $2.50 per day upward.

The registration fee will be $6.00 for men, and $4.00 for women.



OLIVER J. SIZELOVE
Newark Branch, who will read a paper on Chromium Plating Factors.

Platers' Special Cars to Detroit

For the convenience, comfort and pleasure of those attending the convention, arrangements have been completed with the Pennsylvania Railroad for the operation of special cars in sufficient number for the accommodation of those from the various branches of the East who find it convenient or who would care to travel with the party. These cars will be carried on the famous "Red Arrow" train on the following schedule:—**Eastern Standard Time**—Saturday July 6th.

	E. S. T.
Leave New York-Pennsylvania Station	3.15 P.M.
Leave Newark (Market St. Station)	3.37 P.M.
Leave North Philadelphia	5.05 P.M.
Leave Washington (Connection at Harrisburg)	3.55 P.M.
Leave Baltimore (Connection at Harrisburg)	4.52 P.M.
Leave Harrisburg	7.25 P.M.
Leave Pittsburgh—Sunday July 7th	12.54 A.M.
Arr. Detroit—Sunday July 7th	8.45 A.M.

For reservations, communicate at once with Horace H. Smith, 208 N. Third Street, Newark, N. J.

Fares, railroad and Pullman, are as follows:

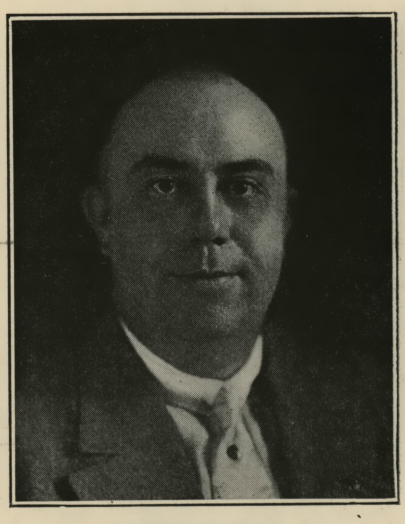
	R.R. Fare	Lower	Upper	Compartment	Drawing-room
New York	$24.82	$6.38	$5.10	$18.00	$22.50
Newark	24.82	6.38	5.10	18.00	22.50
Philadelphia	23.23	6.38	5.10	18.00	22.50
Washington	21.55	6.38	5.10	18.00	22.50
Baltimore	21.55	6.38	5.10	18.00	22.50
Pittsburgh	10.65	3.75	3.00	10.50	13.50

BE SURE TO GET RETURN CERTIFICATES!

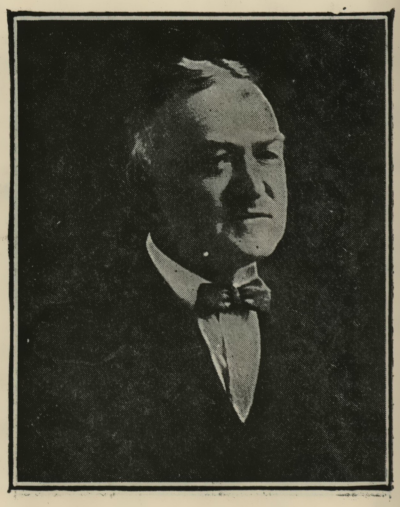
Every visitor at the Convention should make a special point of obtaining a return certificate when buying his ticket for Detroit. The number of certificates required for the reduced fare has been changed from 250 to 150. By the use of this return certificate, visitors will save one half of the return railroad fare if the full quota of 150 certificates is turned in.

Officers of the American Electroplaters' Society

GEORGE GEHLING
Philadelphia Branch
Secretary-Treasurer



F. J. HANLON
Chicago Branch
Editor, The Monthly Review



J. H. FEELEY
Montreal Branch
Past President

Tentative Program of the Convention

Monday, July 8. Morning. Registration and Get Acquainted Period.

Afternoon. Opening Program. Welcome speech on behalf of Detroit.

Evening. Educational Session.

(1) "Scientific Plating Control"—Prof. L. C. Turnock, Turnock Engineering Company, Cleveland, Ohio.

(2) "Wage Incentives"—A. L. Matthes, Westinghouse Electric & Manufacturing Company.

(3) "Industrial Cleaning of Metals"—Dr. A. K. Graham, University of Pennsylvania.

(4) "Executive Foremanship"—J. M. Carmody, Factory and Industrial Management.

(5) Question Box Period.

Tuesday, July 9. Morning. Educational Session.

(1) "Brass Plating"—George B. Hogaboom, Hanson, VanWinkle, Munning Company.

(2) "The Electrodeposition of Iron"—T. P. Thomas, Pittsburgh Branch, A. E. S.

(3) "Electroplating of Cadmium from Cyanide Baths"—Clayton M. Hoff. Grasselli Chemical Company.

(4) "Cadmium Plating"—H. C. Pierce, Udylite Process Company.

(5) "A Report on the Possibilities of Poisoning from Cadmium Plate"—George Dubpernell, Udylite Process Company.

(6) Question Box Period.

Afternoon. Educational Session. Chromium Symposium.

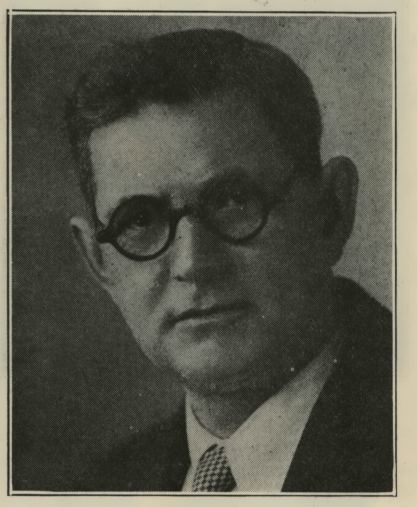
(1) "Chromium Plating Factors"—Oliver Sizelove, Associate Editor, THE METAL INDUSTRY, New York.

(2) "Some Causes of Resistance in Chromium Plating Solutions"—Prof D. T. Ewing. Michigan State College.

(3) "Some Observations on the Corrosion of Chromium Deposits"—Cleveland Nixon, Chicago Branch, A. E. S.

(4) "The Bent Cathode Test for Chromium Plating and Some Observations on Chromium Plating."

Officers of the Detroit Branch



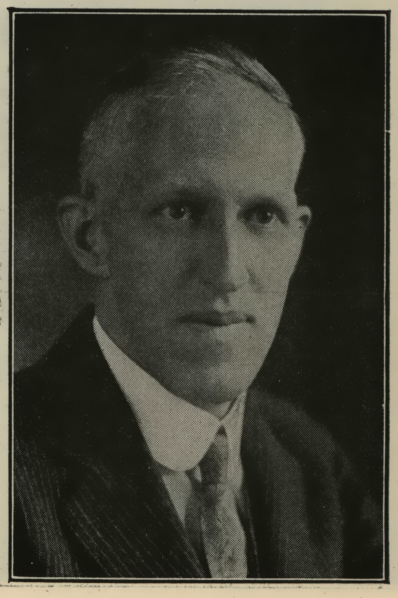
E. V. ALLEN
President,
Detroit Branch

CHARLES PHILLIPS
Secretary-Treasurer,
Detroit Branch

E. G. LOVERING
General Chairman,
Convention Commitee

A. P. MUNNING
Chairman, Hanson-Van Winkle-Munning Company,
Matawan, N. J.

Dr. WILLIAM BLUM
Chief of the Division of Electrochemistry,
Bureau of Standards,
Washington, D. C.



Speakers at International Fellowship Club Luncheon

—Prof. E. M. Baker, Consulting Chemical Engineer, and W. L. Pinner, Chemical Engineer, General Spring Bumper Company.

(5) "Conditions that Cause Changes in the Composition of Plating Baths and Possible Remedies"—Prof. F. C. Mathers, University of Indiana.

(6) Question Box Period.

Evening. Research Session.

CONVENTION HEADQUARTERS

Hotel Statler, Detroit, Mich.

(1) "Summary of Researches on Electroplating"—Dr. W. Blum.

(2) "Final Report Spotting Out of Plated Metals"—W. P. Barrows.

(3) "Throwing Power in Chromium Plating"—H. L. Farber.

(4) "Report of Joint Investigation, Measurement of pH in Nickel Plating Solutions"—Dr. W. Blum.

CHARLES H. PROCTOR,

Founder of the American Electroplaters' Society

(5) "Reports from the Research Committee"—R. J. O'Connor, and P. Sievering.

(6) "Plans for Future Researches."

Wednesday, July 10. Morning. Educational Session.

(1) "Material Costs of Various Finishes"—C. Van Derau, Westinghouse Electric & Mfg. Company.

(2) "The Determination of Boric Acid in Nickel

Buffing and Polishing Room of the Plating Department, Packard Motor Company, Detroit, Michigan.

Solutions"—Dr. H. H. Willard, and G. W. Ashworth.

(3) "Electrodeposition of Non-Metallic Materials" —Milford H. Corbin, Chemical Engineer, Roxalin Flexible Lacquer Company.

(4) "The Measurement of Chlorides in Nickel Plating Solutions"—Donald Wood, Walter S. Wood Company.

(5) "A Warning"—W. M. Phillips, General Motors Corporation.

(6) Question Box Period.

Afternoon and Evening. Trip to Bob-lo.

Thursday, July 11. Morning. Business Meeting. Afternoon. Plant visitation. Evening. Banquet.

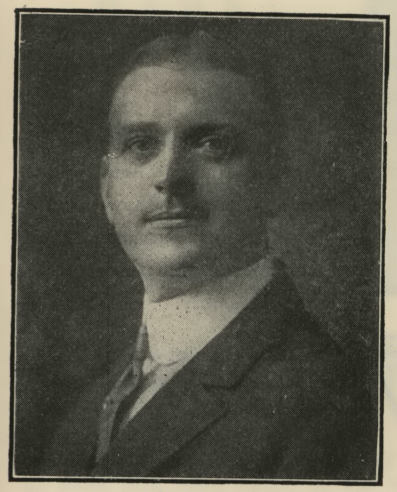
Each paper will be allowed a maximum of 35 minutes for reading and discussion. Additional discussion, if any, will be possible during the "Queston Box" period at the end of each session.

"Question Box" periods, at the end of each session, will be in charge of George B. Hogaboom.

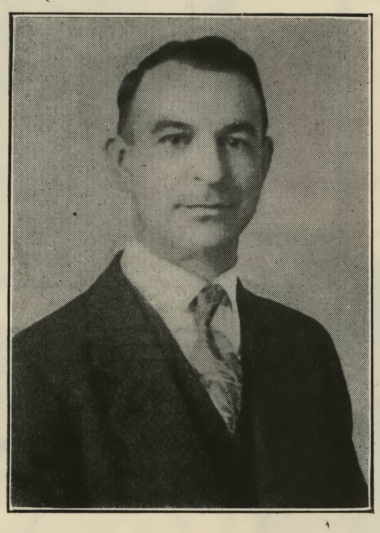
International Fellowship Club

The International Fellowship Club will hold a luncheon on July 9th at the Statler Hotel. The speakers who have been arranged for are Dr. Blum, chief of the Division of Electrochemistry at the Bureau of Standards in Washington, who will speak on Research on Electroplating Processes, and A. P. Munning, chairman of the board of directors of the Hanson Van Winkle-Munning Company, who will talk on the Application of Research Results as Applied to Commercial Practice. Dr. Blum and Mr. Munning are two of the leading figures in the plating industry.

Officers of the International Fellowship Club



F. J. CLARK
Hanson-Van Winkle-Munning Co.
Springfield, Mass.
Chairman



W. W. WELLS, JR.
W. W. Wells, Toronto, Canada
Vice-Chairman

BENJAMIN POPPER
Egyptian Lacquer Manufacturing Company, New York

Flying to Detroit

W. S. McKeown, president of the Sulphur Products Corporation, Greensburg, Pa., will fly to the convention city from Greensburg. He will be the first to fly to a platers' convention.

Chromium Plating Data

Q.—We recently changed from iron anodes to lead anodes in our chromium solution, due to the excess trivalent chromium which formed, but we are having a lot of trouble keeping the lead anodes clean.

A heavy scale forms on them which comes off very hard. We soak them overnight in a saturated salt solution and muriatic acid in the proportion of 1 oz. per gallon. What method of cleaning our anodes would you suggest?

Also, since using lead anodes, recessed portions of our work comes out with a brown film, although it is plated lightly underneath. This film necessitates careful coloring. What causes this brown film?

A.—The coating on the anodes is primarily lead peroxide and the common method used by all those using lead anodes (and they have the same difficulty) is to do as you do. They take the lead anodes out and soak them each night in muriatic acid solution, brushing them off each morning before placing back into the bath.

We believe the brown film is lead peroxide deposited at the cathode in the recessed portions due to decreased current density in the recesses. Have you tried bulging out your lead anodes opposite the recesses? This would increase the current density in the recesses and tend to overcome your difficulty.

—Joseph Haas.

Dust and Fume Exhaust Systems

The removal of fumes and dust which are hazardous to the health of factory employees is a humanitarian necessity to most concerns operating plants where such hazards exist. In most states there are laws which compel the intallation of adequate machinery for keeping the air breathed by workers clean and healthful. In plating and polishing plants air cleansing is a very important factor, due to the large amounts of fumes generated in certain solutions and the dust created in polishing and grinding operations. Writing on the subject of dust and fume exhaust, M. A. Eiben, president of the Northern Blower Company, Cleveland, Ohio, has the following to say in the June issue of The Metal Industry:

The choice of a dust or fume collector depends upon the amount of recovery percentage desired; on whether the recovered material has any particular value; whether the dust-producing operations are continuous; whether there is any risk of nuisance complaints from the neighbors; the amount of danger in the nature of the material to be collected; and lastly—and this is intentionally placed last—the initial and operating cost of the installation necessary to do the job. This is not the usual order of consideration, of course—but unless the system does what it is intended to do, it is a failure, whether it costs the ultimate user much or little.

With these points in view, we will briefly analyze the efficiency and construction of the various types of dust and fume arresters available.

The cyclone type collector is useful mainly for recovering large, hot or highly abrasive dust. It operates on the centrifugal principle. The air, entering the upper part of the collector at an angle, is compelled by the central annular baffle plate to assume a rotary motion. In consequence of the greatly increased cross sectional area of the collector compared with the inlet pipe, the high speed of the air which was necessary to carry the dust through the ducts is slowed down, and the suspended material slowly spirals downwards into the conical hopper below. The air passes out through the open top to the outside of the building.

For high efficiency in dust recovery, it is necessary to use some positive method of filtering and arresting the dust. In the "Norblo" cloth screen arrester, which type has an efficiency of over 99% recovery, the filtering screens are contained in a sheet steel case. The dusty air enters at the lower part of the case, and is slowed down by being directed against a baffle plate which extends completely along the inside of the case, thus forming on its upper side a convenient walkway for use when inspecting or changing the screens, etc.

The checking of the air-speed releases the heavier dust at once, and this falls down into the hopper below. The lighter dust, which in the case of the cyclone collector would pass out into the surrounding atmosphere, pass slowly upward to the gang of closely assembled cloth screens which do the filtering. The dust remains on the cloth surface; and the air, now cleaned and fit to be returned to the shop if desired, passes out of the case to the outlet.

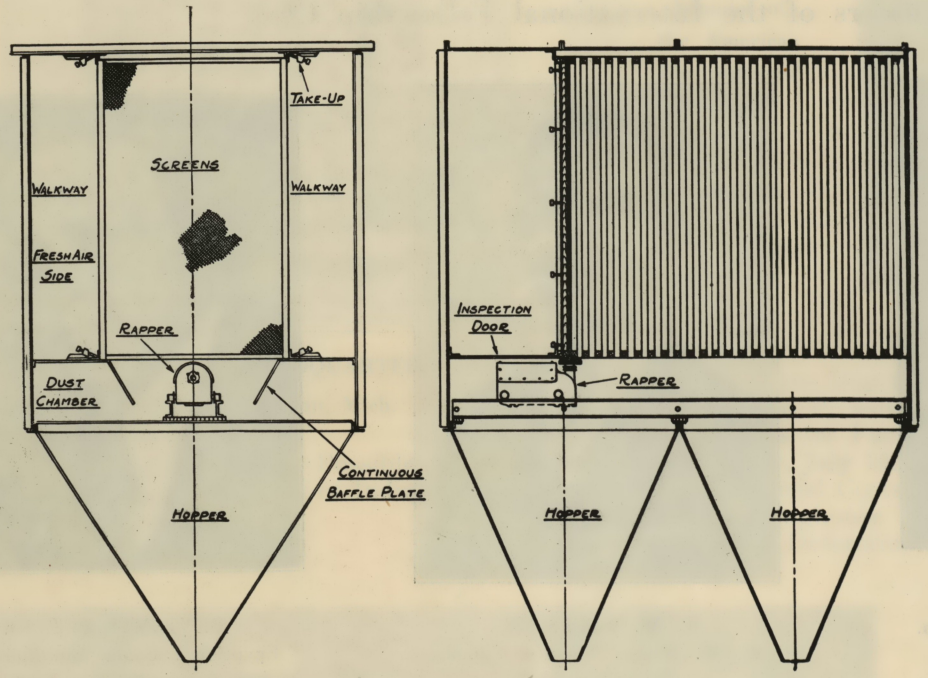


Fig. 1—Sectional Diagram of Norblo Cloth Screen Arrester, Showing Rapping Carriage and Screen Gang Assembly.

In order to maintain proper filtering capacity, it is necessary to shut down the arrester every few hours to shake off from the screens the accumulation of dust which has collected upon them. There are various ways of doing this—by compressed air or cam-operated rapping hammers placed at intervals along the sides of the screen gang, or by a traveling electrically-driven rapper carriage. The latter is generally preferable because it assures each individual screen receiving an equal amount of vibration, and because it involves no complication of long rapping hammer drive-shafts where the length of the arrester case is considerable. This traveling rapper carriage is so arranged that on pressing a button the carriage advances slowly from end to end of the under side of the screen gang, automatically reverses, returns to the starting point and shuts off the current.

As a general rule, the cloth screen type arrester de-

scribed above is adequate to meet all requirements. In a few cases, however, the dust-producing operations are continuous—that is, on a 24-hour scale. The necessity of stopping for a few minutes every four or five hours

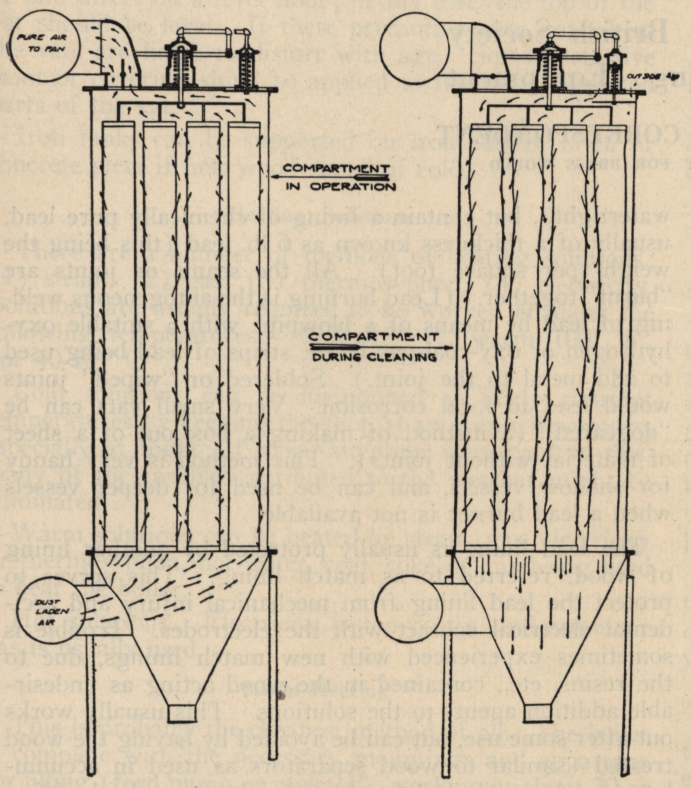


Fig. 2—Sectional Diagram of Norblo Continuous Suction Air-Filter, Showing the Direction of the Air Current for Filtering and for Cleaning Respectively.

in order to rap the screens may therefore be undesirable, as even this brief pause in the dust arresting may permit the air to become charged with floating matter. In such circumstances it is advisable to use a continuous action air-filter. This type of dust removal equipment is more expensive per given air purifying capacity, but it is so constructed that it need never be stopped.

The construction of a "Norblo" air-filter of this type is different from the screen arrester already described. The filter is split up into three or more separate steel case units, each separately controlled by a master valve operated by an electric motor or other convenient means. The cloth through which the air is filtered is not stretched on screen frames but is in the form of bags or "stockings" suspended inside the case units in groups. The sequence of operations is as follows: Nos. 1 and 2 units are filtering the incoming air. The dusty air enters the units at the bottom; passes upwards through the cloth fabric; and enters the clean air chamber on top. Thence it is distributed to the required points in the plant. In the meantime, No. 3 is temporary out of action, the current in it being reversed so as to blow off from the surface of the bags the accumulated dust. After a short interval, the electrically driven master-valve operates to change the air connections of the units. No. 1 is now cut out of action for cleaning instead of No. 3, and Nos. 2 and 3 are on filtering. After another short interval, the master valve again changes the relative air connections, and No. 2 is cut out while Nos. 1 and 3 are filtering. It is thus possible to effect the necessary cleaning without interrupting the operation of the system, and, in fact, any unit can be cut out of action entirely for any length of time necessary to make adjustments or inspections.

The disposition of fumes from plating and pickling tanks is a somewhat different problem. Cloth screens or bags cannot generally be used because of the moisture and of the usually corrosive nature of the chemicals involved. In many cases, too, the vapor has a very definite recovery value. Pickling tanks of caustic soda for cleaning give off large quantities of irritating steam which is charged with the volatile elements of the solutions used. Both caustic and sulphuric acid will attack steel, and the hoods and ducts are often covered with a lead coating to resist this. The fan must also be protected. It is customary to provide a drain pipe in the fan case to collect and return to the tanks all condensed solution which may be trapped there. It is not always necessary to lead-coat or otherwise protect the cyclone collector, though a neutralizing spray on the inside of the collector will add greatly to the life of the steel at this point of the system; and will at the same time help to prevent the corrosive spray from escaping into the surrounding neighborhood and creating an actionable nuisance.

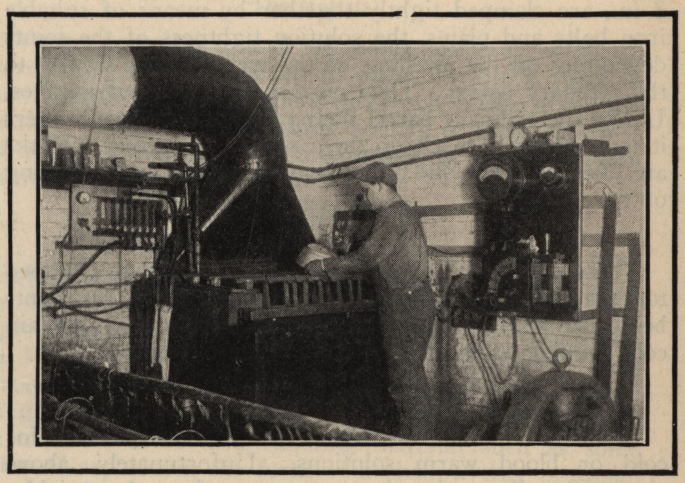


Fig. 3—Special Norblo Fume Exhaust System for Use with Continuous Pickling and Plating Outfit.

Chromium Plating Process

The Electroplaters' Technical Institute, 619 Wellington Avenue, Chicago, Ill., which is in the business of supplying platers with courses of training in electroplating, is offering a new chromium plating process known as "Superchrome" as part of its regular course. This is included under the regular tuition fee, no extra charge for the chromium process being charged.

In regard to the "Superchrome" method, it is stated that it has a high throwing power, that it is easy to maintain and that it is simple to control.

Platers taking the Institute's course are supplied with complete data, including the formula, method of mixing, tank construction, installation of equipment, etc.

Plating Shop Layout and Equipment

Useful Information on Electroplating Plants. British Society Discusses Plating Equipment

BY OUR LONDON CORRESPONDENT

WRITTEN ESPECIALLY FOR BRASS WORLD

AT the March meeting of the Electroplaters' and Depositors' Technical Society, London, an informative paper was presented by J. W. Perring entitled "Electroplating Plant." It aroused an interesting discussion. There are a number of materials that can be used for making vats or containing vessels for electroplating solutions; their use is determined by cost, ease of manufacture and suitability for the solutions they are to contain. They range in size from a few gallons to 50 feet or more long, as follows: wood vats without linings; slate vats; stoneware and glass, round and rectangular; cast iron, enamelled and plain; iron, rivetted and welded; lead lined wood vats; asphalt or hard rubber; Ebonite lined; concrete or brick.

Wood Vats

These are suitable for the weak acid solutions, nickel, zinc, etc. The timbers, usually 8 in. or 9 in. x 2 in. or 3 in., are clamped tightly together by means of suitable iron bolts and plates, the solution tightness of the joints depending on the swelling of the wet timbers, similar to the ordinary barrel. They possess several disadvantages. Unlike the ordinary barrel their rectangular shape renders it more difficult to clamp them securely together. Leaks are likely to occur due to damage in moving or to warping of the timber.

Slate Vats

These consist of 5 slabs of about 1 in. slate clamped together by means of suitable bolts and plates, the joints being made with white lead. These were used to contain cold cyanide solutions, but have fallen out of use.

Stone Ware and Glass

Stone ware tanks are as near the ideal as possible for cold or blood warm solutions. Unfortunately, above about 50 gallons, they become too costly and unwieldy. There is also the risk of breakage.

Glass does not get much further than Laboratory use, as it is much too delicate for the plating shop.

Cast Iron

These can be obtained either plain or vitreous enamelled inside, rectangular in shape with rounded corners. They are very convenient for hot cyanide solutions, etc., but cannot be obtained in very large sizes. The enamel sometimes gives trouble when they are directly heated from the bottom.

Iron Riveted and Welded

These can be used for most hot or cold cyanide solutions, boiling potash, etc. The majority of iron tanks are now welded unless otherwise specified, this being cheaper than rivetting and if properly done quite as good. If required they can be lined with lead or wood, ebonite or similar material, and made in any size.

Lead Lined Wood Vats

These are similar in construction to the wood vats (except that no trouble is taken to make the woodwork watertight), but contain a lining of chemically pure lead, usually of a thickness known as 6 lb. lead (this being the weight per square foot). All the seams or joints are "burnt" together. (Lead burning is the autogeneous welding of lead by means of a blowpipe with a suitable oxy-hydrogen or oxy-coal-gas flame, strips of lead being used to add metal to the joint.) Soldered or "wiped" joints would lead to local corrosion. Very small vats can be "dogeared" (a method of making a box out of a sheet of material without joints). This method is very handy for shallow vessels, and can be used for deeper vessels when a lead burner is not available.

The lead lining is usually protected by another lining of wood, referred to as match lining. This serves to protect the lead lining from mechanical injury and accidental electrical contact with the electrodes. Trouble is sometimes experienced with new match linings, due to the resins, etc., contained in the wood acting as undesirable addition agents to the solutions. This usually works out after some use, but can be avoided by having the wood treated (similar to wood separators as used in accumulators) when required for special jobs, e.g., the building of parts with nickel; the match lining can be left out altogether if one is prepared to take the extra care required.

Alterations to Lead Lined Vats

Where a change in work demands a larger or different size vat, certain alterations in size can be made, i.e., cheaper than buying a new vat. Deepening is the simplest alteration. The match lining is removed, and new timber added to the top, the additional lead lining is allowed to hang about 3 in. over the existing lining to facilitate burning. New match lining will be required for the sides and ends.

Widening requires new ends, additional boards in bottom, new clamping bolts, a strip of lead burnt up the two ends and along the bottom; a few new boards will be required to complete the match lining.

Lengthening requires almost a new vat, or complete re-building and is probably not worth while.

Very long vats require some sort of supports for the sides, otherwise these will bow with age. Lead-covered bolts or tie rods passed through the sides, across the width of the vat, fairly near to the top. Where these are likely to interfere with long work, angle or channel clamping plates can be arranged vertically across the sides and clamped by long bolts passing through or under the bottom of the vat woodwork. The clamping plates can be carried high enough to allow the top bolt to be placed well clear of the vat top. These stays should be placed at intervals of about eight or ten feet, depending on the depth of the vat.

Asphalt or Hard Rubber Lined

These can be built of concrete or brick to support the lining, or iron tanks can be given a lining of this material.

Only cold or blood warm solutions can be used in them, otherwise the lining may become plastic.

Vats should be supported at frequent intervals along their bottom on wood, concrete or brick supports, or can be laid direct on a level floor; in any case, the top of the vat should be level. If these precautions are not taken, the vats are liable to distort with age. Some protective paint or covering shuld be applied to the wood, and iron parts of the vat.

Iron tanks can be supported on iron stands, brick or concrete piers if hot, wood stands if cold.

Heating Solutions

There are a number of methods of heating solutions: (1) steam, (2) gas, (3) thermosyphon, (4) electricity. Solutions are usually required to be worked at about the following temperatures: Cold 15° C., warm 100° F., hot 40-50° C.

Cold solutions can be maintained at fairly constant temperatures by keeping the shop at an even temperature, especially at night; if more attention were paid to this, many of the troubles attributed to the weather might be eliminated.

Warm solutions can be heated by steam, gas, electricity or thermosyphon, hot water, coal, coke or gas being used to heat the boiler.

Hot solutions. Electricity is too costly, and steam or gas is usually used.

Steam Heating

This is probably the cheapest method of all. The boiler is complete with the necessary mountings and apparatus for filling (feed pump or injector), working at about 30 or 40 lbs. per square inch, with the main steam pipe near the shortest and simplest route to enable all the vats to be conveniently picked up. The main steam line should be arranged with a slight fall towards where the steam is required. If the line is "trapped," "water hammer" is likely to occur, with consequent liability of damage to pipes and fittings. Steam can be allowed to pass direct into the solution, and the noise can be prevented by means of a special fitment. This method is convenient for hot water tanks, but not solution, as the steam condenses, and gradually fills the vat.

Steam coils should be designed to bring the solution up to temperature quickly; the steam can then be regulated to maintain the required temperature. The coils should preferably be bent up from the longest lengths of pipe possible to avoid joints under the solution, and arranged just off the bottom of the vat, a slight fall being given to the exhaust end; the live steam can be led in through the open top of the vat, and the lowest end of the coil taken through the side or bottom of the vat to the steam trap.

Gas Heating

Gas could be burnt under a suitable steam boiler, but would probably be dearer than coal. Iron tanks are usually heated by means of circular or straight rows of Bunsen flames, the top of the luminous cone being level with, or just below, the bottom of the tank.

Lead lined vats can be heated by means of a lead tube with a sealed bottom containing an inverted Bunsen burner. The tube is suspended vertically in the solution, actually a gas immersion heater. The thermosyphon principle can also be made use of as follows:

A loop of lead pipe (arranged with one pipe above the other) can be taken through the side of the vat to a gas, coke or coal-fired circulating boiler fitted with a suitable expansion tank, the system being filled with water. If some form of lead boiler is used, the loop and expansion tank can be dispensed with, the solution itself can be circulated.

Electric Heating

Usually electric heaters are of the immersion type, the outer casing being made of a material not affected by the solution. This provides an ideal method of maintaining solution at constant temperature throughout the 24 hours, especially where only about blood temperature is required, e.g., building up with nickel.

Immersion heaters with special casings, e.g., silica, etc., are fairly expensive.

In designing electric heaters one meets with the following difficulties:

The actual element must be insulated electrically from the solution. Unfortunately most suitable electric insulators are also good thermal insulators; thus we have to force our heat through a poor conductor which means that the element cannot dissipate its heat so quickly; if we choose an insulating material of high dielectric strength we can make our insulation very thin.

Mica answers this requirement; even when the element has to run much hotter than the solution.

A number of nickel-cased immersion heaters gave trouble due to corrosion. These were placed in larger containers containing oil and are still in use after some years.

Thermostats

Where accurate control of temperature is required, thermostats can be obtained to open or close a valve in case of steam or gas and operate a switch in case of electric heating. Even where accurate control of temperature is not required they soon pay for themselves as they prevent waste of energy.

Layout of Plating Shop

It is convenient to have the tops of all tanks at the same height, about 3 ft. to 3 ft. 6 in., so that the plater does not have to bend down too far, or raise his hands too high when placing the work on wires in vats. Deep vats can be let into the ground or have raised platforms. Odd corners or where a broom cannot reach should be avoided on grounds of cleanliness. Plating shop floors should be made of some acid resisting material such as some form of asphalt, in the form of a shallow tray or basin, i.e., the floor covering should be carried some distance up the walls, a gentle fall from all parts towards drains or gulleys to prevent the formation of puddles. If asphalt cannot be used on account of cost, well troweled Portland cement can be used, but is not acid resisting. If the nature of the work allows of the floor being kept reasonably dry only a few standing boards or racks are needed for the plater to stand on near the vats, etc. If the floor cannot be kept dry the whole can be covered with a system of racks or gratings capable of being taken up for cleaning and retrieving dropped work, etc.

This arrangement is very convenient where deep vats are used; the racks can be arranged at a suitable height to bring all the vat tops at one level. The various tanks should be arranged to give a correct sequence to the passage of the work through the shop, avoiding all unnecessary walking, especially between cleaning or scouring plating. Where very heavy work is handled a system of overhead runways is very convenient, avoiding handling of the cleaned work and shortening the time of exposure to the atmosphere. Where this cannot be provided some form of lifting tackle arranged over the largest vats is very useful; failing this, a length of steam barrel fixed

about a foot from the ceiling and running parallel over each cathode rod is useful for holding awkward if not heavy jobs, which cannot always be secured to the cathode rods, e.g., jobs that have to be plated in two halves.

Discussion

E. A. Ollard said that where iron vats were used for chromium solutions, if the work tended to approach the sides of the vat, sheets of glass could be hung round the sides, rough glass containing wire netting being very suitable for the purpose. With regard to immersion heaters, filling them with oil prevented much trouble. It was necessary to see they were not earthed, since if the anode side of the circuit were also earthed, they would be likely to corrode anodically.

F. Mason said that electrical measuring instruments were still not as much used in the plating shop as they might be, while occasionally they were misunderstood, as in the case of the shop which put forth Ammeter and Voltmeter in series and wondered why they got poor results! In the case of silver plating plant, often the water which was allowed to run to waste contained appreciable quantities of recoverable silver, and in one plating shop where this water was collected and evaporated by means of waste steam, the cost of the plant was recovered about twice over in the course of a year's working.

S. E. Weill said that wood, if properly prepared, for example, pitch pine, free of knots and thoroughly soaked in water, was the best material for vats. The chief objection was the expense—about three times that of lead-lined vats. One of the best ideas for strengthening tanks was an American one—the trussed beam method being used instead of upright supports.

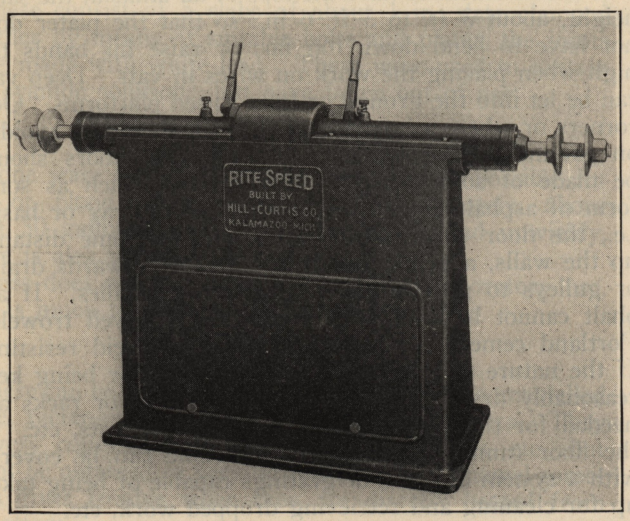
A. E. Boulter said a very necessary plating requisite which had yet to be produced efficiently was a false bottom which made it possible to recover dropped work quickly.

R. Hammond said he could not agree that earthenware vats were ideal. Generally they failed through being porous or due to the separation of the glaze in large flakes from the outside. He asked whether gas immersion heaters were capable of heating a large bath and whether there was any trouble due to the collection of moisture through the combustion of the gas.

H. Lovelock said that match linings to nickel vats often resulted in brittle and cracked deposits in thick nickel deposition. Electric heaters though giving good results, were much dearer usually than any other means of heating.

Two-Spindle Electric Polisher

A new type of double-spindle, electrically operated polishing machine is being placed on the market by the Hill-Curtis Company, Kalamazoo, Michigan, machinery manufacturers. The new equipment is similar in design to the Hill-Curtis single-spindle polishing machine and it is also known as the "Rite Speed." It differs in that it has two independent spindles with two motors to drive them mounted in the base and two separate switches and brakes to control the spindles. The advantages of such an arrangement, the makers state, are obvious to those who have operations requiring rapid change from one kind of wheel to another, and to those seeking to economize space.



Twin-Spindle Polishing Lathe

In describing the machine, the manufacturer states that the power is transmitted to the spindle by means of a Multi-V Belt. Each motor and spindle can be started and stopped independently of the other and each spindle can be operated at different speeds. The speed of the machine can be changed by changing motor pulley when necessary.

These machines are equipped with Hill-Curtis combination switch and brake (patent applied for), eliminating the possibility of applying brake before cutting off the current. With one push forward on the lever, the brake is released and the motor started. In reversing this action, the current is cut off and the brake applied.

Voltage Drop in Plating

Q.—A question has arisen which we should like to place before you for a possible solution. Is there any general practice on which voltage drop is based between plating generator and a plating tank? The particular installation we have in mind is for chromium plating purposes and there is a machine for each tank.

In some cases the machines must be placed as far as 50 feet from the tanks. With the ordinary rule of one thousand amperes per square inch of copper conductor, this gives a drop of 9/10 volts.

We should be pleased to benefit by your experience. Is voltage drop in plating installations based on a percentage of the generator voltage, as in power installations?

A.—The voltage drop or line drop in general practice is the loss in voltage between the generator and the plating tank. The amount of loss in voltage drop depends upon construction of the generator, size of bus bars, and distance between generator and plating tank. The amount of voltage drop is the difference between the voltage that is generated at the machine and the amount that is received at the plating tank, and the greater this distance the greater will the voltage drop.

To overcome this voltage drop it is considered good practice to place the generator as near as possible to the plating tank, but regardless of where the generator is placed, each tank should be equipped with proper control instruments such as rheostat, voltmeter and ammeter, so that the voltage drop can be checked at the tank.

—Oliver J. Sizelove.

Corrosion of Dipping Baskets

Q.—We use sulphuric, muriatic and nitric acids in dilute solutions for cleaning before plating. The nitric acid is used generally for stripping purposes.

We manufacture and finish several million pieces per year of capped nuts and large quantities of other small pieces which must be handled in baskets. We have been unable to find a basket that will withstand the action of the acids for any length of time.

We do a great deal of cadmium plating. The cadmium solution may have some effect upon the baskets we are using.

If you know of an organization furnishing containers for the work we are doing, we would appreciate any information you can give us.

A.—It is possible that the cadmium has the effect of accelerating the corrosion of your baskets if you first pickle in these baskets and later cadmium plate in them. This would be caused by several electric cells on each basket between the cadmium deposit and the base metal of the basket and the bolts and capped nuts you are cleaning. The best plan would be to change your baskets, having separate baskets for pickling and for plating. However, we believe that the above is only a remote possibility.

Most men in your position feel the same way about the huge consumption of baskets of their pickling departments. Frankly, from experience, we have found very little difference in baskets, even those that are supposed to withstand the effects of the acids you have mentioned, after considering the price of Monel metal, duralumin, etc. Some firms use as cheap a basket as they can and replace them when necessary.

—JOSEPH HAAS.

Excess of Sulphur in Solution

Q.—How can we remove an excess of sulphur from a silver solution? The sulphur was introduced into the bath in the form of sulphuric acid. This was put in to remove excessive carbonates, the idea having been to precipitate the silver. This was done and then we washed the precipitate until litmus paper showed the solution to be free of acid. We then added the proper amount of potassium cyanide and expected the solution to be suitable for silver plating again. However, it seems that we did not eliminate all of the sulphur. Can you tell us how to remove all the sulphur from this solution?

A.—By adding sulphuric acid to your solution, you have introduced sulphur in a form which, as far as we know, cannot be removed.

The proper way to remove the carbonates is by freezing them out when the temperature of the solution can be lowered to 28°. This is best done in winter time. An alternate method is to add barium cyanide to the solution and filter the solution after the carbonates are precipitated.

—OLIVER J. SIZELOVE.

Movable Cathode in Silver Bath

Q.—Please advise us as to the advantage of having the negative rod in motion while work is being silver plated. We do quite a lot of silver plating on hotel ware, and have been doing the plating with the negative rod in one position.

A.—The advantage of a movable cathode in plating is to allow for a higher cathode current density and a more equal distribution of the deposit.

—OLIVER J. SIZELOVE.

"Non-Inflammable Gasoline"

Q.—In the February issue of the BRASS WORLD, page 40, there is a question and an answer regarding non-inflammable kerosene.

I am interested in a non-inflammable naphtha and gasoline mixture. In your answer to the above question there is 40 parts by measure of gasoline or benzine and 60 parts by measure of carbon tetrachloride or trichlorethylene. If I add the same to naphtha and gasoline, will I get a non-inflammable mixture? And will the mixture have the same cleansing properties?

Where can we get carbon tetrachloride or trichlorethylene and is it soluble in naphtha and gasoline? Or is it in a liquid form?

A.—Carbon tetrachloride and trichlorethylene are not the same substances or chemicals. We are confident that you have in mind carbon tetrachloride ($C\ Cl_4$), which is a heavy liquid of a pleasant odor. Carbon tetrachloride is an excellent solvent and is mixed with gasoline or benzine (crude naphtha) for cleaning. The mixture is inflammable, due to the presence of halogen compound. It is, however, an expensive mixture. You can buy carbon tetrachloride from any good chemical house.

—JOSEPH HAAS.

Soldering Zinc Plated Steel

Q.—Kindly advise me if it is possible to solder electro-galvanized strip steel. If so, please let me know what the standard practice is.

A.—In soldering galvanized strip steel there are two things to keep in mind. The first is not to use any of the usual soldering acids because they will corrode through the zinc plate; second, the electro-galvanized articles need to be very clean. A good practice is to scratchbrush the surfaces to be united with a clean hard steel scratch brush when and as ready to solder. Tin over evenly the surfaces to be soldered, using ordinary solder, and then place them together and press upon them with a very hot soldering iron. The surfaces will unite perfectly.

—JOSEPH HAAS.

Making Chromium Adhere to Nickel

Q.—I have had some trouble with my chromium plating. I find that the chromium which is deposited over nickel on radiator shells peels. This is because the nickel peels. I make the surface of the shell chemically clean before nickel plating and cannot find out why the nickel peels.

I would also like to know where I can get instruments to measure and control the constituents of the solution.

A.—In depositing chromium over a nickel deposit, trouble is quite frequently encountered by the nickel deposit raising. To obtain perfect adhesion of the nickel deposit requires careful control of the solution so that a soft malleable deposit is produced. The most important constituent of a nickel solution to be controlled is the pH.

There are several methods whereby the pH is readily determined and the one in general use is the colorimetric method. Colorimetric sets can be purchased from advertisers in BRASS WORLD.

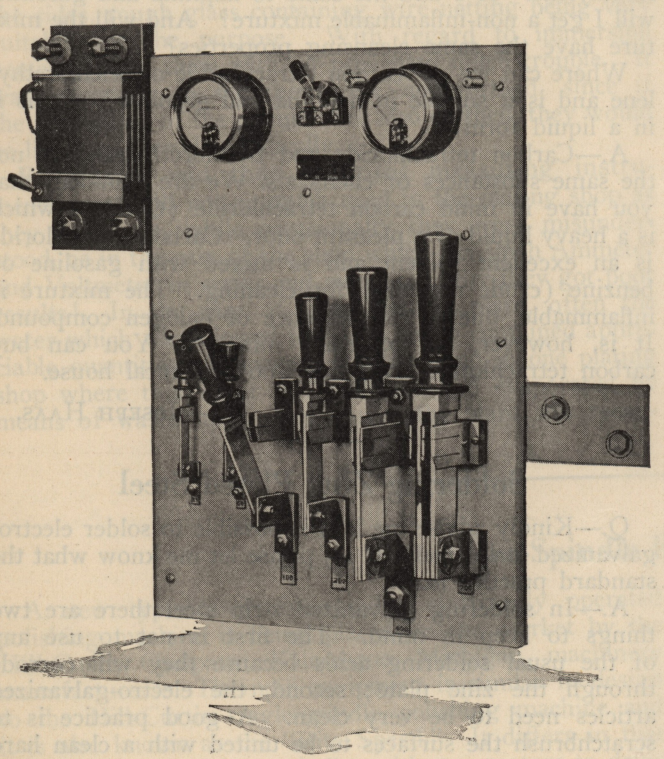
A nickel solution that contains the following constituents has been found to give satisfactory results:

Metallic nickel	2.5 to 3 oz.
Chlorides	2 oz.
pH.	6 to 6.2.

—OLIVER J. SIZELOVE.

Plating and Polishing Equipment

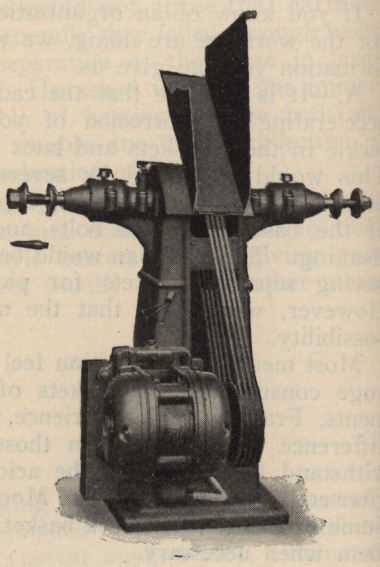
A new type of electroplating tank rheostat has been placed on the market by the Charles F. L'Hommedieu and Sons Company, 4521 Ogden Avenue, Chicago, Ill., manufacturers of platers' and polishers' equipment and supplies. The new rheostat, known as the Reliance, has been designed for accurate regulation of plating solutions of all kinds including chromium. It is of substantial



Reliance Tank Rheostat

construction with coils in the back and the minimum number of switches for close regulation. A double throw switch enables the operators to obtain both generator and tank voltage. It is made in two types and a variety of sizes with capacity for 1000 amperes.

This company has also introduced in the recent past a new polishing lathe, also known as the Reliance, which is built to operate at any speed from 1200 to 3600 revolutions per minute, using alternating current. The lathe is belt driven from a motor and speeds are changed by changing the size of motor pulley. A hinged hood is furnished with the machine to provide complete protection against belt and pulley, although the belt and pulley,



Reliance Polishing Lathe with Belt and Pulley Guard Lifted

as shown in the illustration, are left easily accessible. Vertical adjustment of the motor tightens the belt.

On this equipment, the motor frame is set back, allowing complete freedom for the operator and ample clearance for any size of work. The motor is completely enclosed to insure continuous operation. It is air cooled.

Both motor and lathe are ball bearing. The equipment is furnished complete with starting switch in which is incorporated a push-button control.

Scum on Copper Anodes

Q.—We are having a little trouble in copper plating. We have made up a copper plating solution which is used mainly for cleaning. Solution is as follows:

Water	1 gal
Copper cyanide	2 oz.
Sodium cyanide	4 oz.
Soda ash	2 oz.

to a gallon of water.

We are using a hot solution in a steel tank plating at 6 volts. We give the work a copper strike.

The work seems to be coming out satisfactory, but the anodes are covered with a black scum. What we are interested in is the cause of this black scum.

A.—Indications would point to a low free cyanide content. As you are using this solution mainly for a strike solution, we would advise the addition of two ounces of sodium cyanide to each gallon of solution.

We have found that where hyposulphite of soda is used in a cyanide copper solution the anodes will coat over with a black scum, but this will disappear when the current is off, providing there is enough free cyanide in the solution.

If after the addition of the cyanide to the solution the anodes still coat over, send us a two-ounce sample of solution for analysis.

—Oliver J. Sizelove.

Black Nickel Solution

Q.—Please give us the formula for a good black nickel solution.

A.—Formula for a black nickel solution:

Double nickel salts	8 oz.
Sodium sulpho cyanide	2 oz.
Zinc sulphate	1 oz.
Water	1 gal.

Use this solution at 80° Fahrenheit, with 6 volts. Keep the pH at 5.8 to 6.

—Oliver J. Sizelove.

Chromium Plating Fundamentals

A Discussion of Chromium Plating in All Its Aspects, Theoretical and Practical—Part 11*; Applications of Chromium Plate

By P. E. EDELMAN
Electrical Engineer

WRITTEN ESPECIALLY FOR BRASS WORLD

Rust Prevention

STRICTLY, chromium plate cannot be considered for rust prevention without according due credit to the true undercoating metal which assists it.

When however, the base coating is soft nickel, chromium plated thereover can be considered as a valuable rust preventing coating. Chromium itself without assistance of a base coating such as soft nickel, would not prove generally useful as a rust resisting coating because of its porous properties and tendency to open crack fissures through which rust corrosion may progress unless checked by a base coating.

Buffed chromium plate is undoubtedly entitled to a higher rating for rust prevention than is unbuffed plate. A distinction must be made between appearance and utility, in that a coating which has an initial mirror silver finish may fail as an anti-rust coating unless a suitable undercoating has been prepared over the base iron or steel metal.

Corrosion Prevention

Closely related to rust prevention is the problem of corrosion prevention. This includes a wider scope of base metals, such as copper, brass, etc. Certain chemical industries now make effective use of chromium plate over treating tanks of copper, etc., whereby the chromium coating effectively resists corrosion of chemicals handled therein.

An instance of this is found in the paper industry, where copper tanks plated with chromium give good service in the handling of borax, ammonia, and tri-sodium phosphate. In the petroleum industry, chromium plate has found acceptable service on still fittings. It withstands the corrosion of flue gases and sulphur compounds. Some other applications demonstrated are to be found in acid containers, evaporator tubes, condenser tubes, and apparatus parts used in chemical industries for handling alkalies.

Chromium as a Heat Resistant

Chromium has found some application as a heat resistant material in plated coatings on turbine blades, plate glass rolls, paper rolls, and reflectors. It is not suitable however for parts exposed to the atmosphere at high temperatures.

Mechanical Uses

The mechanical uses of chromium surfaces are principally for resistance to wear, but in some applications other functions such as resistance to corrosion or appearance also are factors. Among the uses of this class may be mentioned, applications in bearings, cams, gauges, mandrels, electrotypes, glass molds, valve seats, casting and forging forms, rubber molds, files, reamers, and drawing dies. It should be kept in mind that when a hard wearing surface is required, the base metal must have analogous properties in order to fully utilize the hardness property of chromium. It is in mechanical uses of chromium plate that relatively thick deposits are important and here too, the character of the coating must be controlled to minimize voids, cracks, and fissures. Perhaps the first commercial application of mechanical properties of chromium plate on a large scale was demonstrated in the case of printing plates. Chromium surfaced engraved plates are still one of the important applications of chromium plating in world-wide service. Looking into the future, it is reasonable to expect a growing use of chromium plate for mechanical service, particularly in the automotive and aeromotive fields of application.

Jewelry

Few people realize the change that chromium plate has made in the low and medium priced jewelry trade. Chromium plated ornaments and articles of jewelry of all sorts are fast reaching a predominant position in this class of trade. A peculiar situation has been met by the jewelry trade in the case of rings in that chromium plated rings cannot be re-sized and soldered as in the case of white gold, etc. This is due to the oxidation of chromium at high temperature in the presence of the atmosphere. The custom has arisen accordingly of sending out such re-sized rings to a plating shop for re-finishing. Many articles of yellow gold which became of obsolete demand when white gold became popular have been successfully re-finished with chromium plate. Not even the introduction of tantalum ware for jewelry ornaments has caused such a change in the fine jewelry trade as has chromium finished jewelry. Even the market price of platinum has been affected by this change and trend toward chromium ware. The advent of cheap chromium plated articles and poor specimens of such work, however, is likely to decrease the initial esteem in which such chromium ware was held by the buying public. The future may find more novelties such as belt buckles, vanity cases, ash trays, and pencils chromium coated and fewer high priced articles of jewelry sold as chromium ware.

Appearance Utility

Appearance utility is the most obvious application of chromium plate. We see it daily on the streets and in the homes and offices, everywhere. Among such applications are found electric appliances, golf clubs, medical instruments, hardware, fountain equipment, plumbing fixtures, and, more extensively, automobile trim and accessory parts. The use of chromium ware is indeed, legion.

Improvements

From this survey, it is evident that while chromium plating is highly commercial and technical in its exacting

* Parts 1 to 10 were published in our issues for August to December, 1928, and January to May, 1929.

requirements, there remains much room for improvements in technique and art of application. The diverse uses of chromium ware are certain to stimulate advances in the art. When it is remembered that such an old art as nickel plating has lately been changed for the better as a result of technical investigations, it is apparent that chromium plating studies still have a long course ahead.

Unusual Uses

The usual uses of chromium plate for mechanical, corrosion resistance or decorative purposes are supplemented by many special applications. The total of special uses of chromium ware bulks small in comparison with any one of the standard applications thereof, but they are nevertheless important. For example, important use of chromium plate is made in surgical tools and equipment, in scientific apparatus of all sorts, in special vacuum tubes, in electrical parts, etc. Attempts to extend the use of chromium surfaces as a friction bearing material have so far found only minor applications, but with improvement in alloys used for shafts, cams, etc., there may be very extensive use of chromium for friction surfaces in the future. Nearly all of the mechanical arts await a better bearing surface than is at present generally used, and some combination of a good wearing alloy coupled against chromium may afford the answer.

Exterior Trim

Exterior trim and hardware employing chromium has recently come into much favor. All sorts of locks, hydrants, fire fighting equipment, store front moldings, etc., are appearing daily on new building construction.

Plated Raw Stock

A growing tonnage of raw stock, sheet metal, wire, rod, etc., is being plated with chromium. Much of such raw stock is treated by the continuous method, in which the raw material is successively drawn through a series of treating tanks and rewound for commercial sale. If the art grows as may be anticipated, some very large installations may be located near favorable industrial centers, much as in the case of the electrolytic refining industry. The average job plater would be agreeably surprised to inspect some of the present-day automatic and semi-automatic conveyor plating equipments used in large plants and it seems safe to predict that only a start has been made in the trend toward automatic processing in large establishments.

Saturation Point Is Far Distant

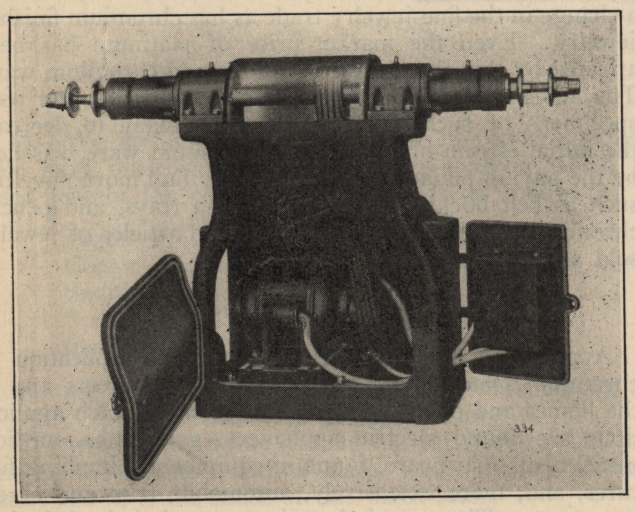
The saturation point in the uses of chromium plating is far in the future and the art can be expected to be highly standardized long before such a time is reached. The reason that chromium plating technique may be expected to advance rapidly is that it receives the constant attention of many of the best minds in the art and the industry, ranging from the efforts of the producers of the raw chemicals required, up through the equipment companies, the accessory companies, the laboratory men, the engineers, the designers, the shop men, and not in the least, finally, the operating plater.

This series will be continued in an early issue.—Ed.

New Type Polishing Machine

A number of special features have been incorporated in a new type of buffing and polishing machine which has been designed and placed on the market by the Hisey-Wolf Machine Company, Cincinnati, Ohio, makers of machinery and equipment for polishing, grinding, cutting and other processes.

The new equipment, which is shown in the illustration,



Texdrive Polishing and Buffing Machine

is known as the "Texdrive" due to the use of a Texrope driving belt. The makers state that other special features of the machine include a safety wheel nut made of Tobin bronze; the use of flat-top threads in the wheel nut which give increased security in holding the buffing and polishing wheels in position; an oiling system which has been especially arranged for the quick flushing of bearings and which has gauges to aid in regulating lubrication; a large one-piece spindle made of nickel steel; large ball bearings or Timken roller bearings, as desired by the user; a labyrinth seal which protects the bearings from dirt and dust; increased rigidity of spindle as a result of bearing boxes which are keyed into the column; accuracy of alignment also due to the last mentioned feature; easy adjustment for the horizontally mounted motor with four-point bearings; the Texrope drive.

New Iron and Steel Cleaning Compound

A new addition to the list of metal cleaners manufactured by the Apothecaries Hall Company, Waterbury, Conn., is Ahcoloid No. 11, especially compounded for use on iron and steel. One of the chief ingredients of this cleaner, according to the manufacturer, is an emulsifying agent which is completely soluble. In this way the cleaner is stated to have colloidal properties without the objectionable insoluble residue sometimes encountered in cleaners of the colloidal type.

The new cleaner is said to be most effective in cleansing cast and malleable iron and hot or cold rolled steel. These metals can be cleansed of heavy oils and greases, including the usual run of graphitic impurities. While the compound is being used most generally for cleaning before plating, the makers declare that it is also used as a cleaning agent prior to lacquering, enameling and assembling.

The Use of the Low Pressure Sand Blast

There appears to be a great deal of misunderstanding as to what sand blasting is and what it is meant to accomplish, even among those who might be expected to know all about it, says R. E. Sibley, of Leiman Brothers, New York, in the June issue of The Metal Industry. His company manufactures equipment for sand blasting, polishing, pumping and other purposes. He continues:

First of all, there are two kinds of sand blasting. One which uses high pressure air (from five pounds per square inch up to and even exceeding 100 lbs. pressure). The other kind uses air at less than five pounds pressure. The high pressure sand blast accomplishes its work by the brute force of the impact of the abrasive propelled by the high pressure of the air. The other does its work not so much by the great cutting force of the abrasive as by the repeated impact of the sand under the force of the low pressure air.

Each has its own definite field. One does its own peculiar work to better advantage than the other, so it is important to know something about the matter in order to decide whether or not you can profit by its use and if so whether you ought to use high or low pressure.

If too high a pressure is used on sheet metal articles, they will curl up or buckle. For this reason the low pressure sand blasting is best.

Most die castings can be improved in appearance by the use of low pressure sand blasting. This process accentuates the natural color of castings and where they are to be electroplated, painted, enameled or otherwise finished the sand blast produces a mat finish or surface to which the plate, paint or enamel will readily adhere.

Any grade of sharp white sea sand, granulated or powdered flint or crushed steel may be used as an abrasive, and when propelled by the air through the sand blast nozzle it cuts into the surface of the article producing a roughened effect directly in proportion to the grade used, whether fine, coarse or medium.

Now a great many articles are given a mat or satin finish by means of scratch brushing using fine coarse metal wire brushes. This requires skill on the part of the operator in order that just the right effect be produced continuously. Other articles are finished by dipping in acids, but this practice is subject to the enactment of restrictive laws, the acid of course being dangerous.

These objections do not apply to low pressure sand blasting. Think of a square, box-like cabinet somewhat like a paint spray hood except that it is entirely enclosed. You stand in front of the machine just like a bookkeeper at his high desk and, in fact, with very little more preparation, if any.

There are two openings in the front of the machine through which you push your hands. Those openings usually have cloth cuffs or sleeves which fit snugly around the wrists, preventing the dust from the sand blasting operation from coming through and out into the room.

All the work is done inside this cabinet under the nozzle which is in the centre. You hold the article under the nozzle and watch it being sand blasted through the glass window in the front of the cabinet.

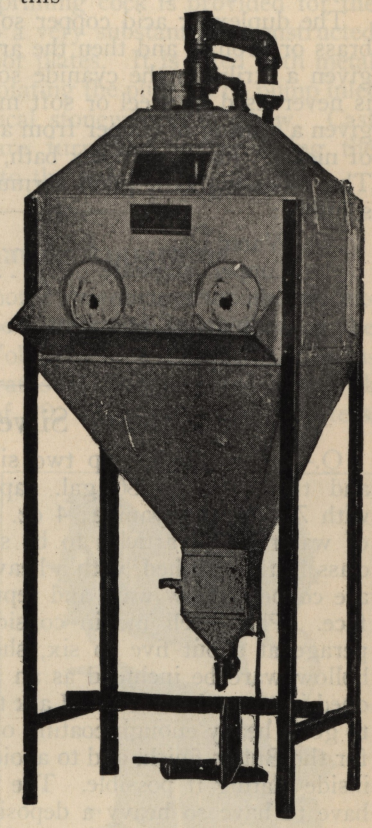
The flow of sand is regulated by a pressure of your foot on a foot treadle and as you watch the article if you think one little spot needs just a little touch more of the blast you touch your foot on the treadle and a spurt of sand at the nozzle does it.

A supply of your articles which of course are small and light enough to be conveniently handled in this way has been put into a wire tray or basket through the side door of the cabinet before beginning operations. This lot is laid directly under the nozzle in such a position as to receive the benefit of the impact of the rebounding sand from each article actually being held in your hand under the nozzle.

As each article is lifted from the wire tray under the nozzle it is, as will be seen from the above, already partially sand blasted so that the time required to touch it up under the nozzle by hand is greatly reduced.

And now where's all this sand coming from and where's it all going to after it leaves the nozzle? Well it drops to the bottom of the machine just where it came from and it comes up again through the pipe to the nozzle and repeats over and over again continuously so that only about a pail of abrasive is all that is required, and this lasts for many days.

Of course from the constant bombarding of thousands of articles daily this sand gradually becomes broken into still smaller grains, becomes pulverized to such an extent that the sand stream eventually loses its cutting force. So when this is noticed it is only necessary to add a little more sand to the supply in the machine to keep it up to its standard of efficiency.



One Type of Low Pressure Sand Blast

In practice the basket method above will be found better than the travelling belt. In using a belt or other conveyor most articles would be blown away as soon as struck by the sand stream and the operator would spend a great part of his time retrieving them.

A sand blasting machine of this type is not expensive. In fact it is very low in price. The air supply you may possibly already have; in fact most probably you will find it in the blower you use for agitating your plating solutions, running your gas furnaces or blowing stampings or chips from your presses or other machine tools.

Radio and electric light bulbs may be frosted partly or entirely or letters stencilled on the glass or on the metallic or bakelite bases. Lettering or fancy designs may be stencilled on plate glass or on drinking glasses or bottles. All sorts of articles in all sorts of materials come within the scope of this truly amazing factory operation. All in all it is a labor saving operation, a sales increasing finish in itself, a means for increasing the effectiveness and longevity of other finishes and withal a health-promoting process that may be installed in any type of factory at comparatively slight expense.

Duplex Copper Solution

Q.—We are having numerous complaints regarding our plating. We have been using copper strike. Duplex copper has been recommended to us.

Will you kindly mail us the formula for duplex copper and kindly suggest whether or not we can add chemicals to the bath we are now using and also advise us what kind of tank we should use, metal or wood.

A.—We are in no position to suggest remedies on difficulties experienced with plating baths unless specific problems are mentioned, which you have not done. We cannot suggest additions unless we know a little of the history of the plating solution to be remedied.

The duplex or acid copper solution is used on straight brass or bronze, and then the articles are most frequently given a strike in the cyanide solution. The duplex bath is never used on steel or soft metals unless they are first given a coating of copper from a cyanide bath or a coating of nickel. For the duplex bath, a lead-lined tank is used. The following is a good formula for a copper sulphate solution:

Water	1 gal.
Copper sulphate	16 oz.
Sulphuric acid	4 fluid oz.
Voltage of operation	½ to 1.

—Joseph Haas.

Heavy Silver Plate

Q.—I am making up two silver solutions, one of 76 and the other of 86 gal. capacity. Will make same with 7 oz. soda cyanide; 4 oz. silver chloride per gallon of water. The articles to be silver plated must be first class Butler finished, with a heavy, durable coating. They are copper hollow ware and represent 1½ to 2 ft. of surface. Please tell me in considering the necessary amperage at about five to six, should the interiors of this hollow ware be included as an active surface to be reckoned in to total surface? I ask this as I want the interiors to get a heavy enough coating of silver to stand the brush for the Butler finish, and to avoid the necessity of separate inside plating if possible. The inside, of course, will not have to have so heavy a deposit as the outside. Would you say that the formula as given above will give me a good heavy wearing plate for hollow ware, with one hour's plate? I wish to avoid the use of nickel before silver if possible, and have small porcelain tank to use as striker, with ¾ oz. silver chloride, to 6 oz. sodium cyanide. Also have yellow mercuric oxide to prepare mercury dip with. Would you say that the mercury dip, used after cleaning copper articles, a strong flash in the strike, and then an hour's deposit in the above silver solution would give a good and substantial coating of silver? Would I gain much by wet brushing the articles after expiration of half hour's plating, and then continuing plating for half hour again?

Have been working with silver quite a bit, but this company wishes a very fine and good heavy deposit, so am requesting your suggestions.

A.—Your silver solution made as per your formula will contain approximately 3 ox. of silver and 3 oz. of free cyanide per gallon. Such a solution, while containing enough metal, would be a little low in free cyanide. It is best to have the solution analyzed before making further additions of cyanide.

A deposit from this solution with proper amount of free cyanide and a cathode current density of 5 to 6 amperes per sq. ft. for one hour should be sufficient. In calculating the amount of cathode surface, both the inside and outside surface should be considered, providing the inside receives a deposit.

The silver strike will be about right, although another ounce of cyanide per gallon of solution would be better.

The wet scratch-brushing operation can be eliminated but it is advisable to try a piece or two of the work after plating 5 or 10 minutes to see if the silver deposit is adherent.

If a proper rack is devised to hold the article while plating, you will not be compelled to attach a weight to hold the work in the solution. The opening should face the anode and if no air pocket is formed, you should have no trouble plating the inside.

—Oliver J. Sizelove.

Plating Drawn Zinc

Q.—A customer of ours, manufacturing window shade rollers, wishes to use ferrules such as the enclosed sample. These are made of drawn zinc and must be nickel plated by the user. He has tried to plate these but without success, in a mechanical barrel. He believes that unless there is a way to do it in a mechanical barrel, he will have to give up use of zinc for this purpose.

The method heretofore has been to clean, copper strike, then nickel plate the ferrules.

In your opinion, can this kind of a zinc product be successfully plated in a mechanical barrel? If so, what method of cleaning and what plating solutions would you suggest? Work thus far has been experimental, so that new solutions can be tried. Please answer at length, if necessary, giving all details.

A.—You should have no trouble nickel plating in a barrel the zinc ferrules, if proper methods are used.

If the work is covered with oil from the drawing process, wash in gasoline or naphtha and tumble in clean hardwood sawdust. Plate without any further cleaning in cyanide copper barrel solution that contains 4 ozs. metallic copper, 3 ozs, free cyanide, and just enough hyposulphite of soda to brighten the deposit. Use at 110° to 120° F., and plate until a fairly heavy deposit is obtained. Rinse thoroughly and transfer to nickel solution which is made as follows:

Double nickel salts	10 ozs.
Sodium chloride	7 ozs.
Boric acid	2 ozs.
Sodium citrate	1 oz.
Water	1 gal.

—Oliver J. Sizelove.

Rustproofing Steel

Q.—We are at present finishing metal letter boxes made of 24-gauge black iron by spray painting with bronze lacquer. Of course, the metal ultimately rusts through. We are wondering whether a preliminary dip in a copper sulphate solution would be of any value as an undercoat. The shape and size of the box makes the cost of electroplating with copper or zinc prohibitive.

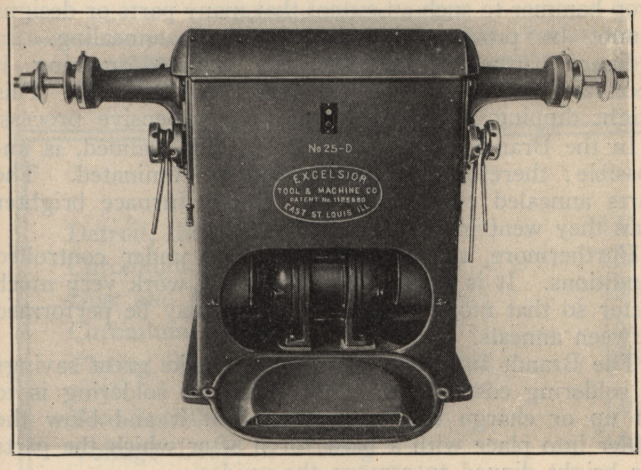
A.—Giving your steel boxes a preliminary dip in copper sulphate would be of no advantage in eliminating your trouble in resisting rust ultimately. It would, however, retard it slightly. Considering the matter from all angles, economy of handling and permanency of results, we cannot see how you can do otherwise than plate the boxes, preferably with zinc or cadmium. Unless you do that you will always be bothered with rust.

—Joseph Haas.

Twin-Spindle Polishing Lathe

A new type of double-spindle polishing machine, known as the No. 25-D, has been placed on the market by the Excelsior Tool and Machine Company, East St. Louis, Ill.

According to the description by the manufacturer, the



Double Spindle Polisher

machine is equipped throughout with dust-proof ball bearings. The motor, as shown in the illustration, is enclosed in the base. Other features of the machine are given as follows:

On the back of the housing is a retainer shelf for the abrasive compound handy for each operator. It also has a slot for the spindle wrench and an extension on each side which can be used to attach the dust hoods or collectors.

Any make or type of motor can be installed. There are two separate spindles on one stand without any operating parts between the motor and the spindles. Speed can be regulated between 1500 and 3000 R. P. M. There are no shifters, loose pulleys, belt idlers or overhead dust-carrying belts and there are no operating or revolving parts between the motor and the spindles; only the motor and spindles require lubrication.

Stoneware-Lined Centrifugal Pumps

A new line of chemical stoneware-lined centrifugal acid pumps has been placed on the market by the U. S. Stoneware Company, 50 Church Street, New York City. The new line, known as the "U. S. Standard Centrifugal Acid Pump," is said to have efficiencies approximating those of metal pumps used under analagous conditions. They are recommended by the makers for the handling of acids, alkalis, chemicals and all corrosive solutions, weak or strong, with the exception of hydrofluoric acid.

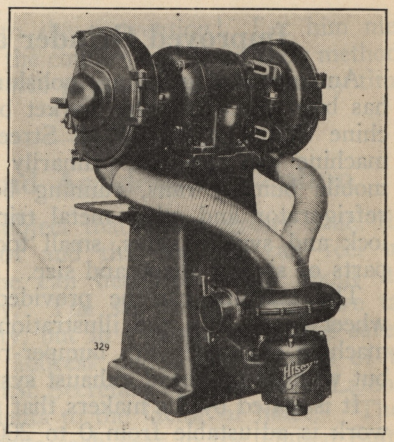
In these pumps, it is stated, the impellers are of the non-clogging type with the fluid passages arranged to handle solids in suspension without difficulty. A metal bushing is cast integral with the impeller where the shaft goes through. This metal bushing is machine threaded and the impeller is mounted directly over the steel shaft, thereby eliminating impeller breakage as experienced with the older types of stoneware lined pumps.

The metal bushing is fully protected and sealed against contact with the fluid handled, by the shaft sleeve and stoneware nut threaded on the outer end of the shaft. Complete ball bearing equipment is furnished, consisting of extra heavy, deep-groove ball bearings, mounted in a dirt and dust proof bearing housing. There is provision for grease lubrication as well as for Alemite grease gun connections. The bearing unit consists of one held bearing which maintains the rotor in positive position and prevents lateral movement, absorbing at the same time, any lateral thrust of the rotor. The second bearing floats and allows for expansion and contraction of the rotor due to change of temperature. A patent application is pending on this feature.

A chemical stoneware priming cock is provided for the pump discharge. This is a very substantially constructed valve, protected with armor plates. It is fitted with metal rigging for holding and rotating the plug. The pump inlet is provided with a chemical stoneware 90° elbow. Cast iron clamps and bolts are furnished for attaching the elbow and priming cock to the pump.

Dust Exhaust Apparatus

An all ball bearing, motor driven type of electric exhauster equipment has been designed and placed on the market by the Hisey-Wolf Machine Company, Cincinnati, Ohio. This apparatus is designed for use with grinders using wheels of 10, 12 or 14 inch diameters,



Exhauster Equipment Mounted on Grinding Machine

and with buffing or polishing machines with wheels of 8, 10 or 12 inch diameters.

The equipment, as shown in the illustration, is operated by a motor attached to the bottom of the grinding or polishing machine base, at the rear. One automatic motor starter simultaneously controls the motor for the exhaust apparatus and for the machine itself.

Chromium Polishing Composition

A new type of polishing compound for chromium plate has been placed on the market by the Zucker Sons Company, 627 First Avenue, East Roselle, New Jersey. The new product is a gray, molded type of compound known as "Krombrik." It is especially recommended for use on large chromium plated surfaces, where it is said to operate rapidly without destroying even a thin plate. It produces a black mirror finish, according to the makers, who offer to submit samples of it on request.

New Type Annealing Furnace

A new type of annealing furnace has been placed on the market by Weisberg and Greenwald, 71 West 45th Street, New York City, engineers and sales agents. The new apparatus, known as the Brandt furnace, anneals, solders or heat treats such metals as gold, nickel silver, sterling silver without oxidizing them, it is stated, and it will deoxidize metals that have been blackened by exposure to the flame of a blow torch. It is peculiarly adaptable to those industries which use nickel silver, sterling silver, gold, etc., in large quantities.

Annealing, Soldering and Heat Treating Furnace

These metals harden under the blows of a press or drop hammer to such an extent that many parts or designs cannot be produced without repeated annealing. In ordinary furnaces the work is oxidized making it necessary to "bright dip" in some kind of acid. This bright dipping is a troublesome and expensive process.

In the Brandt furnace, oxidizing, it is claimed, is impossible; therefore, bright dipping is eliminated. The parts annealed come from the Brandt furnace brighter than they went in.

Furthermore, the annealing is done under controlled conditions. It is possible to anneal the work very much better so that more severe operations may be performed between anneals.

The Brandt furnace is also said to make great savings in soldering cost. The usual method in soldering is to set up or charge the work, then heat it and blow the solder into place with a blow torch after which the parts are bright dipped to remove the oxides.

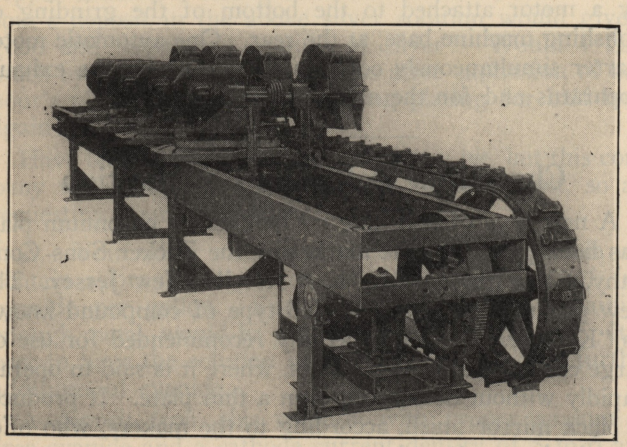
By the Brandt method the parts are held together by appropriate means, the solder is placed in the proper position and trays full of work are put into the furnace to come out cool, bright and finished from the discharge end.

Improved Grinder and Polisher

An improved grinding, polishing and buffing machine has been placed on the market by the Kent-Owens Machine Company, 958 Wall Street, Toledo, Ohio. This machine was designed primarily for such work as automobile bumper rails, running board strips, show case, refrigerator and other metal trimmings, flat iron bases, lock and switch plates, small tools and numerous other parts of similar shape and size.

The machine can be provided with any number of wheel heads. In the illustration is shown a four-head machine equipped with bumper-rail fixtures and motors, but without overhead exhaust system.

It is stated by the makers that the wheel pressure upon work is adjustable from 0 to 200 pounds while the machine is in operation. The angular wheel adjustment permits a setting of wheels at angles up to 10 degrees to the right or left of the line of work travel. Driving is by means of flexible V-belt from motor spindle.

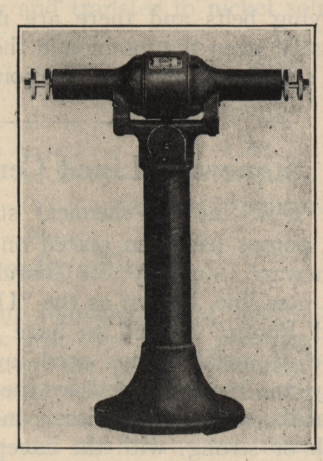


Four-Head Polishing Machine

The work belt is steel faced, riding on roller bearings supports beneath the wheel contact area, thus it is said, eliminating belt stretch.

Buffing and Grinding Lathes

A new line of electric grinders, buffers and polishers is being manufactured by the Sterling Electric Motors, Inc., Telegraph Road and Atlantic Boulevard, Los Angeles, California. The company states that these machines, one of which is shown in the illustration, are air cooled as well as unique in a number of other features. The machines, it is claimed, are lower in price than other similar lines.



Pedestal Type Lathe for Grinding, Polishing and Buffing

The Sterling line of grinding and polishing equipment includes the following: bench grinders of ¼ horsepower and 3600 revolutions per minute speed; pedestal type grinders and polishers of ½ to 5 horsepower with speeds up to 3600 revolutions per minute.

The company supplies also motors, guards, eyeshields, switches and other accessories.

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CONTENTS

Detroit, the Platers' Convention City..... 131
Chromium Plating Data..... 135
Dust and Fume Exhaust Systems..... 136
Chromium Plating Process..... 137
Plating Shop Layout and Equipmnt..... 138
By Our London Correspondent
Two-Spindle Electric Polisher..... 140
Voltage Drop in Plating..... 140
By Oliver J. Sizelove
Corrosion of Dipping Baskets..... 141
By Joseph Haas
Excess of Sulphur in Solution..... 141
Movable Cathode in Silver Bath..... 141
"Non-Inflammable Gasoline"..... 141
Soldering Zinc Plated Steel..... 141
Making Chromium Adhere to Nickel..... 141
Plating and Polishing Equipment..... 142
Scum on Copper Anodes..... 142
Black Nickel Solution..... 142
Chromium Plating Fundamentals—Part 11.. 143
By P. E. Edelman
New Type Polishing Machine..... 144
New Iron and Steel Cleaning Compound... 144
The Use of the Low Pressure Sand Blast.. 145
Duplex Copper Solution..... 146
Heavy Silver Plate..... 146
Plating Drawn Zinc..... 146
Rustproofing Steel..... 146
Twin-Spindle Polishing Lathe..... 147
Stoneware-Lined Centrifugal Pumps..... 147
Dust Exhaust Apparatus..... 147
Chromium Polishing Composition..... 147
New Type Annealing Furnace..... 148
Improved Grinder and Polisher..... 148
Buffing and Grinding Lathes..... 148
Editorials 149
Questions and Answers..... 150
Associations and Societies..... 153
Personals 153
Business Reports in Brief..... 154
New Companies..... 156
Trade Publications..... 156
Metal Prices..... 157
Supply Prices..... 158

Send the Plater to the Convention

FROM July 8th to the 11th, the seventeenth annual convention of the American Electroplaters' Society will be held in Detroit. The program includes papers on every important subject in electroplating and finishing.

It is idle to say that all this information will come out later, or that any of the time is wasted. In the first place it takes months for these articles to appear in print and the discussions are rarely, if ever, reproduced in full. Then again each of the four days has three sessions. Most of the sessions are educational. The one or two sessions connected with business are unavoidable in any meeting. Only one afternoon and two evenings are devoted to entertainment, and anyone who has attended the platers' conventions knows that these periods of entertainment are spent largely in "swapping dope" about troubles, remedies, new solutions, new machinery and equipment. It is in these "private sessions" that some of the most valuable information is gained.

Send your plater to the convention! Let him meet men from all parts of the country and learn their methods. Four days in Detroit will pay for themselves many times over.

Fresh Air and Accident Prevention

THERE is one subject that never grows stale, that we never tire of and that no one can feel imposed upon when he can hear too much about it—the subject of safety. The sad thing is that we talk safety and hear safety, but in a pinch we forget safety.

In a recent radio address under the auspices of the National Safety Council, Secretary of Commerce, Lamont, attributed most accidents to the factor of haste. "There are ten million accidents each year in the United States, ninety-five thousand of which are fatal. The trouble is that in our haste we have forgotten the instinct of self-preservation. . . . We have workmen's compensation laws, factory inspection codes, child labor laws, regulations demanding mechanical safety guards and safety practices in many states. But in the end, responsibility must rest on the individual."

No truer words were ever said. But how many consider the fact also that accidents are more frequent when men are tired than otherwise? How many notice that the "tired feeling" is naturally worst toward the latter part of the working day? How many know that one of the most important causes of tiredness is insufficient or impure air? How many are careful to keep their offices and plants well ventilated? It may seem a far cry from closed windows to injured men, but the connection is there nevertheless.

If the personal element in safety prevention could be summed up in a few words, it would seem that these words would be, "Be careful; don't rush; breathe fresh air." There are undoubtedly many other admonitions possible, but the perfect observation of these simple rules would prevent most of our preventable accidents.

Questions and Answers

All inquiries are answered in the order received and, whenever possible, the answers published in the next regular issue

Analysis of Solutions

Q.—If there is any way that we can run a chemical test on brass plating solution, we would appreciate very much information concerning the apparatus necessary and the procedure.

We have never heard of this being done outside of a regular laboratory but think that with a small amount of equipment we could make periodic tests ourselves.

A.—The analysis of a brass solution is quite difficult and if not made correctly will be misleading and unsatisfactory. The method of procedure for the analysis was published in THE METAL INDUSTRY for June and July, 1926.

We would suggest that you read these issues and if you then believe that you can do the work, would be pleased to advise you further.

—OLIVER J. SIZELOVE.

Black Background for Rings

Q.—Have you ever heard of any formula that will successfully work as a black oxidize on white gold? In class rings we find it difficult to high-light the lettering so it will stand out against the background, because it is the same color all the way over and you cannot put on the rose finish treatment as on a yellow gold ring.

A.—Would suggest that you use the following method to produce a black in the background of the rings:

Double nickel salts	8 ozs.
Zinc sulphate	1 oz.
Sodium sulpho cyanide	2 ozs.
Copper sulphate	1/64 oz.
Water	1 gallon

Use 1 volt pressure, operate at 80°F. Relieve the background work with felt wheel and the plain part with regular rag polishing wheel.

—OLIVER J. SIZELOVE.

Blue on Steel

Q.—We make small sockets of alloy steel, namely SAE 3140, which is a 40 carbon, 1½ per cent nickel steel. When these sockets are taken out of the jaw after being heat treated, they are a very pretty natural blue color. They are, however, coated with considerable scale, because of the high carbon content. This scale must be tumbled off in an acid solution, which is also combined with small steel balls to help the acid to knock off the heavy coating which is formed during the heat treating process. It is not possible for us to get this scale off with just a soap solution combined with the steel balls. We have tried this and we have also tried a number of different kinds of cleaning solutions put on the market by different chemical companies. They are not strong enough to take away this heavy scale coating. We therefore have to resort to the acid solution combined with the steel balls.

When the socket has been tumbled in this solution, it loses the blue steel color and becomes a blackish gray. This color is objectionable to our customers. We wonder whether there is anything which we can put in the tumbling solution to keep the color on the sockets or put the color back on the sockets.

We understand that the sockets can be blued by a hot process with nitrates. It is our desire, however, to stay away from this extra operation. Do you know of anything which can be put in our acid tumbling solution to keep the blue color on our sockets?

A.—If the sockets are properly cleaned before heat treatment so as to remove any oil or grease, we do not believe that the heavy carbon scale will be formed.

There is no alkaline cleaning or soap solution that will remove carbon scale that we know of. Do not believe that you will be able to use the nitrate method you speak of for this must be used at a temperature of 700° to 900° Fahrenheit to produce a blue color. This would probably destroy the heat treatment process you mention.

You could probably use a black nickel solution for your finish if you must use acid and steel balls to remove the carbon scale. After black nickeling, a treatment with paraffine oil helps to preserve the finish.

—OLIVER J. SIZELOVE.

Improving Silver Solution

Q.—We are having considerable trouble lately in getting a good deposit of silver on copper. It seems that the solution contains something we cannot control. It is our intention to have the solution as follows:

Silver	1½ oz.
Free cyanide	2 oz.
Carbonates	½ oz.

We have been using potassium cyanide for our solutions and we are wondering whether it would be better to change over to sodium cyanide. It has been recommended that we change our bath as follows:

Silver	2 oz.
Free sodium cyanide	2½ oz.
Potassium chloride	½ oz.
Potassium carbonate	½ oz.

It seems rather strange to us that we should mix the potassium with the sodium and we would like to get your opinion just which is the best.

We are sending you under separate cover a bottle of the solution. You will note at the bottom of it a black sediment which we are unable to explain. Will you kindly let us have your opinion?

A.—Analysis of silver solution:

Metallic silver	0.75 oz.
Free cyanide	0.86 oz.
Carbonates	1.74 oz.

Would suggest that you add to the solution 1 ounce of silver cyanide and 2 ounces of potassium cyanide. The solution will then contain 1½ oz. of silver and approximately 2 ounces of free cyanide per gallon. The carbonate content will increase as the solution is used, but a carbonate content of 1.74 oz. per gallon is not too high.

We do not believe that you can improve upon this solution for your class of work. So we would not advise you to change your present one.

The black sediment is sulphur and has been introduced into the solution by the use of a brightener or through the water used in the solution.

If you are using carbon disulphide as a brightener, care must be used as an excess will cause trouble.

—Oliver J. Sizelove.

Buffing and Lacquering Die Cast Metal

Q.—What is the best method or solution to clean buffing dirt from die casting materials and what lacquer would you suggest to use in lacquering die castings?

A.—A good method of removing buffing dirt from die castings is to soak them in gasoline and with a brush rub out, when the dirt has a tendency to stick. Dry in sawdust. For a lacquer, we would suggest that you write to any of the lacquer firms advertising in Brass World.

—Joseph Haas.

Building Up Nickel Deposit

Q.—We have been asked to build up with a nickel deposit the worn parts of automobiles. Any information you could offer us on this process would be appreciated as we have never ventured in this direction before. We operate a plating works in London.

A.—The method of building up worn automobile parts with nickel is not being used to any considerable extent in the United States. It is customary to replace the worn parts with new ones, as it is cheaper and more satisfactory.

However, if you wish to experiment with the process, we would recommend the following nickel solution:

Double nickel salts	8 oz.
Single nickel salts	16 oz.
Boric acid	4 oz.
Sodium chloride	4 oz.
Water	1 gallon

Temperature, 120°F.; 20 amperes per square foot of work surface.

—Oliver J. Sizelove.

Low pH and Chloride in Solution

Q.—I am sending you a sample of a nickel solution which I made up of 16 ozs. single nickel salts and 2 ozs. boric acid to each gallon of water. I have a 260 gallon tank of this solution. The tank was obtained from people who formerly used it for a nickel solution for plating die cast metal. I washed it out pretty well before placing the solution in it. It worked pretty well at first. I have been away two months and now I find that in using this solution there is trouble. I wire up nine stove legs on one wire and I find that the bottom one comes out all matted up while the other eight are all right. They color up nicely and show a good deposit. At first the work would come out with black streaks in it, but I added a small amount of acid to the bath and the streaks disappeared. But the bottom one on each wire still matts.

As I have never had such a case before, I would rather not experiment with the solution until I hear from you, as I might spoil the whole bath.

A.—Analysis of nickel solution:

Metallic nickel	2.15 ozs.
Chloride, as ammonium chloride	0.63 oz.
pH	5.2
Zinc	trace

The pH of the solution is low; also the chloride content. We would recommend the addition of 30 lbs. of ammonium chloride and 16 ozs. of 26° ammonium hydroxide to the 260 gallons of solution.

Zinc in the solution is the cause of the black streaks. You can overcome this by working the solution at a high current density for some time. We would suggest that you do so before making the suggested additions.

—Oliver J. Sizelove.

Maintaining Copper Solutions

Q.—I am sending you a sample of an acid copper solution that is causing me trouble by plating roughly. Will you please specify what can be done to make this solution operate properly?

I would like to know the uses of the following chemicals in a cyanide copper solution: sodium cyanide; soda ash; sodium bisulphite; sodium hypo-sulphite. What effect would an excess of any or all these have on the solution? How can such excess be corrected? Is there any way of telling which is causing trouble without chemical analysis?

A.—Analysis of the acid copper solution:

Metallic copper	4.80 ozs.
Sulphuric acid	7.01 ozs.

Solution is low in metal and high in acid content. It is the high acid content that causes the solution to streak.

Add 6 ozs. of copper sulphate to each gallon of solution and do not add any more sulphuric acid for some time to come.

In a cyanide copper solution, sodium cyanide is used to put the metal into solution; soda ash is used as a conductor when a new solution is made from copper cyanide; sodium hyposulphite is used as a brightener; and bisulphite of soda has no use.

If the anodes coat over when solution is in work and do not clear up when solution is not in use, the indication is that cyanide is needed. An excess of hyposulphite will cause a hard deposit.

—Oliver J. Sizelove.

Plating Solutions

Q.—Will you kindly publish the following formulas for me:

18 carat white gold solution.

18 carat white gold stripping solution.

Your best platinum solution.

Your best white gold tin solution to flash 18 carat mountings white.

Best antique dark green solution for a real green finish.

A.—The proper method of making any gold alloy solution is to run the gold into solution by the porous pot method:

Dissolve 4 oz. of sodium cyanide in each gallon of water and connect up tank for regular plating practice. Place anode on anode rod and suspend on cathode rod a porous pot filled with a cyanide solution (4 oz. sodium cyanide, water 1 gallon) and into the porous pot place a piece of carbon connected to the cathode rod. Use a high current and the amount of gold alloy that is dissolved from the anode is determined by weighing the anode at intervals.

Strip for 18 carat white gold:

Sodium cyanide	8 oz.
Rochelle salts	2 oz.
Ammonium phosphate	1 oz.
Water	1 gallon

Temperature, 140° F.; 6 volts.

Platinum solution:

Platinum chloride	12 pwt.
Ammonium phosphate	6 oz.
Sodium phosphate	32 oz.

Dissolve the three salts separately in water. Add the ammonium phosphate solution to the platinum chloride solution and stir well. Then add the sodium phosphate solution and boil until all traces of ammonia have been expelled. Make up to 1 gallon of solution and use at 150° F., with 1 to 1.5 volts.

Tin solution:

Sodium cyanide	1 oz.
Tin chloride	¼ oz.
Water	1 gallon

Temperature, 120°; 1 to 2 volts.

Antique green gold solution:

The metal should be put in solution by the same method given for white gold, but using a green gold anode instead of the white gold anode. After the right amount of gold has been dissolved from the anode, add the smut solution in very small quantities. This is made of lead carbonate, 1 oz.; caustic soda, 4 oz.; water 1 quart. Use at 140° F.; 5 to 6 volts.

—Oliver J. Sizelove.

Throwing Power in Chromium

Q.—I operate a plating plant in Birmingham, England, and have installed chromium baths. I find that on flat work my solutions produce good results, but where the work has hollows or recesses, the solution will not produce a deposit. The flat surfaces of such work will take a good deposit and the hollows will not be covered, even if very shallow, and where a nickel plate would go on easily. Therefore I should like to have you give me the following information:

What is the best solution to use for work with recesses?

What is the best method of operating such a solution?

What density, heat, power, time and anodes are required?

A.—Chromium plating solutions do not have as good throwing power as nickel solutions because the efficiency of the chromium solution is quite low as compared to nickel.

There are several factors that control the efficiency of the bath, namely, metal concentration, current density, temperature, control of the sulphate and tri-valent chromium content of the bath.

A solution that is used in the United States that will give good results is as follows:

Chromic acid	55 oz.
Sulphuric acid	0.3 oz. by weight
Water	1 gallon

Use lead anodes; temperature, 95° to 100° F.; cathode current density, 50 to 75 amperes per square foot.

In chromium plating deep recess work it is sometimes necessary to place the anode near or into the recess before the surface is entirely covered.

Write to the Superintendent of Documents, United States Government Printing Office, Washington, D. C., U. S. A., for a copy of Technologic Paper No. 346, enclosing 15 cents. This paper contains valuable data on chromium plating and should be of great help to you.

—Oliver J. Sizelove.

Water for Nickel Solution

Q.—I am sending you a sample of my nickel solution and also a sample of water that has given me a great deal of trouble out here in Iowa. My trouble has been with nickel pitting. This seems to occur always after the addition of water. The water here has a great deal of iron and sulphur in it.

I would like to know if the water alone is to blame or is the solution at fault otherwise. I operate with about 16 amperes to the square foot; 85° Fahrenheit.

A.—Analysis of nickel solution:

Metallic nickel	3.19 ozs.
Chloride, as ammonium chloride	9.86 ozs.
pH	5.8

The chloride content is very high and should be reduced. The only way to do so is by taking some of the solution out of tank and replenishing with water. We would suggest that you take a third of the solution from the tank and replenish with water. Raising the temperature to 90° or 95° is also suggested.

The sample of water sent contains a large amount of calcium sulphate and sulphurretted hydrogen and is a very poor water to add to a nickel solution. If it is necessary to use this water, we would recommend boiling the water for some time before replenishing the nickel solution with it.

—Oliver J. Sizelove.

Zinc in Nickel Solution

Q.—We are sending you a sample of a defective nickel solution for analysis and advice. We recently made up this solution as follows:

Water	1 gal.
Single nickel salts	8 ozs.
Epsom salt	12 ozs.
Nickel chloride	2 ozs.
Sal ammoniac	2 ozs.
Boric acid	2 ozs.

To every hundred gallons of solution we added one-half ounce cadmium chloride and muriatic acid.

The solution was operating very well but suddenly it began to turn out black, streaky work, such as the samples enclosed with the sample of solution. We tried to remedy it in several ways. We added single nickel salts and nickel chloride, which seemed to help for a short time, but soon it was again producing defective work. We increased the current to 7 volts but this did not help, so we reduced it to 3 volts again. The high voltage burned the work.

What amperage is best per square foot of work surface? Some say 2 and others say 4 amperes. What causes burning, voltage or amperage?

Our nickel tanks are at a standstill until we have your advice.

A.—Analysis of nickel solution:

Metallic nickel	2.32 ozs.
Chloride, as ammonium chloride	3.19 ozs.
Zinc	trace
pH	6.2

Analysis shows the pH to be a little high for your class of work but the trouble is not from this cause. The factor that causes the deposit to have the black appearance is the presence of zinc in the solution.

Would suggest that you add 3 fluid ounces of C.P. sulphuric acid to each 100 gallons of solution and work solution for some time with the highest current density possible. Use some old plating racks or pieces of iron for cathode material. After the solution has been worked

for a day or so with a high current density, it may be necessary to add more cadmium chloride to produce a bright deposit. Add carefully, as an excess causes the deposit to be very brittle.

Four amperes per square foot of cathode surface can be used with a bath of the above composition without burning. An excessive amperage causes burning, and the voltage is an indirect factor, for the amperage does the work; the voltage being used to force the amperage to do the work.

—Oliver J. Sizelove.

Associations and Societies

American Electroplaters' Society

HEADQUARTERS, CARE OF GEORGE GEHLING, 5001 EDMUND STREET, PHILADELPHIA, PA.

New York Branch

HEADQUARTERS, CARE OF R. J. LIQUORI, 2439 HUBBARD STREET, BROOKLYN, NEW YORK

Officers Installed

At the regular meeting of the New York Branch of the American Electroplaters' Society, held in the World Building, Park Row, New York City, June 14, 1929, the following officers were installed in office by past president Thomas Haddow:

President, Fred Haushalter; vice-president, Ralph Liquori (formerly secretary); secretary-treasurer, John Sterling; recording secretary, Charles Haushalter; Librarian, Henry Levine; sergeant-at-arms, Ben Nadel; assistant sergeant-at-arms, Elias Schorr. The following trustees were named: A. Havens, J. Rolff, Frank MacStoker. Delegates to the Detroit convention will be: Frank MacStoker, Fred Haushalter and John Sterling.

—Charles Haushalter, Recording Secretary.

Rochester Branch

HEADQUARTERS, CARE OF CHARLES GRIFFIN, 24 GARSON AVENUE, ROCHESTER, NEW YORK

Officers Elected for 1929-1930

The Rochester Branch of the American Electroplaters' Society held a meeting May 17, 1929, at which the following officers were elected for the 1929-1930 year:

Clarence Reama, president; William Hart, vice-president; Charles Griffin, secretary-treasurer; Thomas Harper, librarian. The Board of Managers is as follows: S. P. Gartland, Frank Mesek, R. P. Lopez. Convention delegates were named as follows: S. P. Gartland, R. P. Lopez, F. C. Mesle.

The Rochester Branch will hold its next meeting Saturday evening, July 20, 1929, at Buffalo, N. Y. All platers and others interested in the plating and finishing arts are urged to attend and hear a good speaker who will be provided for the occasion.

Personals

T. O. Koopman, formerly general superintendent of the National Lead Company's plant at Matawan, N. J., has assumed the duties of manager of that company.

Louis Peik, chief engineer of the American Foundry Equipment Company, Mishawaka, Ind., has sailed for France, Germany and England, arriving in London in time to participate in the foundry congress in that city.

Emerson P. Poste, has become factory manager of the Chattanooga Stamping and Enameling Company, Chattanooga, Tenn., where he has been chemical engineer since 1925. Mr. Poste is president of the Engineers Club of Chattanooga.

William S. Mossman has joined the firm of Mossman-Yarnelle Company, Indianapolis, Ind. He resigned as sales, production and advertising manager of the Dudlo Manufacturing Company, maker of wire and insulated wiring, Indianapolis.

Everett W. Boughton, is now in charge of a new sales department for the R. T. Vanderbilt Company, New York, established to serve the paint, varnish and lacquer industries. Mr. Boughton was manager of technical service of the New Jersey Zinc Sales Company.

A. D. Lynch, personal director, Ohio Brass Company, Mansfield, Ohio, addressed the May meeting of the Pittsburgh Foundrymen's Association on May 20, outlining a plan for securing co-ordination and co-operation of activities among executives, foremen and employees in foundries.

J. P. Andrae, is concluding negotations with the United States Navy Department at Rock Island, Ill., on a contract for aluminum alloy castings, which will necessitate immediate expansion of production facilities at the Beekman Street plant, Cincinnati. Mr. Andrae is vice-president of Aluminum Industries, Inc.

S. S. Little, is now assistant metallurgist of the Ohio Brass Company, Mansfield, Ohio. He was formerly connected with the Walworth Company, Attala, Ala., the Warren Foundry and Pipe Company, Phillipsburg, N. J., and lately with the Fate-Root-Health Company, Plymouth, Ohio, as foundry superintendent.

Neil C. Hurley, formerly head of the Hurley Machine Company, and **J. F. Roche,** formerly vice-president of the Apex Electric Distributing Company, are now respectively president and executive vice-president of the reorganized Binks manufacturing Company of Chicago. This company was formerly known as the Binks Spray Equipment Company.

Louis E. Murphy succeeds the late Charles E. Carpenter as president of E. F. Houghton and Company, Philadelphia, Pa. The following were also elected: **A. E. Carpenter,** first vice-president; **George W. Pressell,** second vice-president and secretary. The company produces oils and leathers for industrial use and has plants at Detroit, Chicago and Philadelphia.

Harbour Mitchell of E. J. Lavino and Company, Philadelphia, Pa., dealers in refractories and metals, has been transferred to the main offices from his previous position as Pittsburgh district sales manager. He will carry on more important duties at the firm's headquarters. **Robert E. Runyon,** since 1925 identified with the company at its general sales offices in Philadelphia, will succeed Mr. Mitchell at Pittsburgh.

R. L. Cathcart has established an office at 2247 Oliver Building, Pittsburgh, Pa., and will act as exclusive agent on tin for Metal Traders, Inc., New York, in the Pittsburgh district. He will also do a brokerage business in slab zinc, lead, antimony, cadmium and other metals. Mr. Cathcart was for eight years district sales manager at Pittsburgh for the New Jersey Zinc Sales Company, New York, and then, for the past three years, he was vice-president of the E. E. Zimmerman Company, Pittsburgh.

L. B. Green, after an absence of five years, has returned to the Glove Machine and Stamping Company, Cleveland, Ohio, as works manager. In 1924 Mr. Green resigned as superintendent, and since that time has performed special engineering work for several companies, including the Meadows Manufacturing Company, Bloomington, Ill., for which he developed a variable-speed washing machine.

George Gehling—Correction

The last issue of BRASS WORLD carried, on pages 124-5, the erroneous statement that George Gehling, of Philadelphia, had taken a position with the Standard Plating Company. It was also stated that he had been with the Elevator Supplies Company, Hoboken, N. J., for several years. Mr. Gehling is not with the Standard company and was with the Hoboken concern only for several months, he states. We trust that the error has caused no serious misunderstanding.

Business Reports in Brief

Jefferson Iron and Metal Company plant, Steubenville, W. Va., was destroyed by fire.

Jewel Emblem Manufacturing Company, 1500 W. 79th Street, Chicago, Ill., will erect an addition, 46 by 78 ft.

Kazian's Brass Foundry, Seattle, Wash., has leased a building on canal waterway block No. 1 from Port of Seattle.

Empire Metal Products Company, Chicago, Ill., awarded contract for one-story, 120 by 180 ft. plant. Estimated cost $60,000.

H. F. Miller, Davenport, Iowa, jewelry manufacturers, suffered a small loss by fire in the McCullough building at 122 W. Third Street.

H. Kramer and Company, 2125 Loomis Street, Chicago, Ill., awarded contract for the construction of a smelting plant. Estimated cost $100,000.

James Morrisson Brass Manufacturing Company, 9 Adelaide St., W., Toronto, Can., plans a four story addition to factory. Estimated cost $160,000.

Bridgeport Brass Company, Bridgeport, Conn., awarded contract for a one-story, 40 by 120 ft. tube mill and storage building. Estimated cost $100,000.

H. A. Seymour Company, Fairfield, Conn.. manufacturer of metal novelties, plans a one-story, 40 by 200 ft. factory on Post Road. Estimated cost $45,000.

Skinner Company, Ltd., Gananoque, Can., plans the construction of a 100 by 400 ft. factory for the manufacture of automobile bumpers. Estimated cost $200,000.

Pangborn Corporation, Hagerstown, Md., manufacturer of sand-blast equipment, has plans for a one-story addition to cost more than $100,000 with machinery.

Auto Specialties Manufacturing Company, St. Joseph, Mich., J. W. Tiscornia, vice president and general manager, is having plans drawn for foundry addition.

Mueller Company, Decatur, Ill., manufacturers of cast iron pipe and brass products, plans the construction of a first unit of plant here. Estimated cost $100,000.

Royal Show Case Company, 648 Wythe Avenue, Brooklyn, N. Y., has plans for a one and one half story unit, 45 by 100 ft., to cost about $50,000 with equipment.

City Auto Stamping Company, Toledo, Ohio, manufacturer of metal stampings, has filed plans for a one-story plant, 230 by 300 ft., to cost over $1,000,000 with equipment.

Clayton-Lambert Company, French Road, Detroit, Mich., manufacturer of brass accessories, awarded contract for a one-story, 100 by 100 ft. factory. Estimated cost $40,000.

Aluminum Company of America, Garwood, N. J., is receiving bids for a two-story, 60 by 120 and 25 by 150 ft. additions to aluminum factory at Garwood. Estimated cost $40,000.

Quality Aluminum Casting Company, Waukesha, Wis., has plans for an addition, 88 by 105 ft., part two stories and basement. **A. G. Pankratz** is president and general manager.

Peerless Lighting Company, 1124 Folsom Street, San Francisco, Calif., manufacturer of lighting fixtures and equipment, plans rebuilding part of their plant destroyed by fire recently.

Thomas Maddock's Sons Company, Ewing Street, Trenton, N. J., manufacturer of sanitary ware, has plans for a two-story addition, 80 by 100 ft., to cost about $50,000 with equipment.

C and M Metal Products Corporation, Pittsfield, Mass., has arranged for space in Potter Building, Main Street, and for the production of dies, metal stampings and kindred products.

Searchlight Metals Manufacturing Company, Richmond, Va., has awarded general contract for two one-story units, 45 by 130 ft., on local site, for production of brass and copper specialties, babbitt metal, etc., to cost over $45,000 with equipment.

National Electric Products Corporation, operated by American Copper Products Corporation, Bayway, Elizabeth, N. J., has plans for a one-story plant, 96 by 360 ft. to cost about $100,000 with equipment.

Beaver Manufacturing Company, Newark, N. J., manufacturer of electrical wiring equipment and devices, has awarded contract for a two-story and basement addition, to cost about $45,000 with equipment.

C. N. Fries Company, 3625 South Ashland Avenue, Chicago, Ill., manufacturer of linoleum paste, lacquers, etc., awarded contract for the construction of a one-story plant at 66th Place and E. Narragansett Avenue.

Multiplex Display Fixture Company, 918 No. Tenth Street, St. Louis, Mo., manufacturer of store and display equipments, has asked bids for a two-story addition, 60 by 105 ft., to cost about $40,000 with equipment.

Precision Castings Company, Syracuse, N. Y., which recently completed a plant at 12600 Berea Road, Cleveland, Ohio, will probably construct an addition soon according to **J. R. Millspaugh,** district representative.

American Platinum Works, 231, N. J. Railroad Avenue, Newark, N. J., will readvertise for bids soon for a four-story 50 by 125 ft. addition to factory at Oliver Street and N. J. Railroad Avenue. Estimated cost $50,000.

Tolhurst Machine Works, Troy, N. Y., manufacturers of centrifugal machinery, have moved their New York office to Hudson Terminal Building, 30 Church Street. **W. T. Powers** will be in charge of the new office.

Roessler and Hasslacher Chemical Company, Niagara Falls, N. Y., manufacturer of industrial chemicals, has awarded general contract for a one-story addition for storage and distribution, to cost $50,000 with equipment.

Janney Cylinder Company, 7425 State Road, Philadelphia, Pa., manufacturer of engine cylinders and kindred mechanical products, has plans for a one-story machine shop addition, to cost about $23,000 with equipment.

J. and S. Paynier, 835 Humboldt Street, Brooklyn, N. Y., plans the construction of a two-story, 75 by 180 ft. smelting plant at the foundry at Borden Avenue and Haywood Street, Long Island City, N. Y. Estimated cost $40,000.

Carew-Leidjen Company, Muskegon, Mich., recently organized to manufacture electric signs and displays, has leased a building at Muskegon Heights and will remodel for a new plant. **F. J. Carew** and **M. C. Leidjen** are heads.

Redinger-Ball-Morris Company, Logansport, Pa., manufacturer of cutouts, relays and other kindred electrical equipment, has asked bids on general contract for a one-story addition, 60 by 180 ft., to cost about $30,000 with machinery.

American Enameled Wire Company, Muskegon, Mich., is planning expansion program to cost about $100,000, including installation of additional equipment. The company is a subsidiary of the **Electric Auto-Lite Company,** Toledo, Ohio.

Wiremold Company, 410 Asylum Street, Hartford, Conn., manufacturer of conduits, electric wiring devices, etc., will take bids at once for the first unit of a new plant at Elmwood, two stories, 98 by 200 ft., to cost over $50,000 with equipment.

Atlas Electrical Company, 916 Green Street, Philadelphia, Pa., manufacturer of electrical equipment and supplies, is having plans revised for a two-story addition, including improvements in present plant, to cost about $40,000 with equipment.

King Whiteway Company, Sheffield, Ala., manufacturer of ornamental street lighting equipment and fixtures, is considering plant enlargements, to cost more than $30,000 with machinery. The company is a subsidiary of the **Union Metal Manufacturing Company,** Canton, Ohio.

The Linde Air Products Company, New York, reports its new oxygen producing plant at Oklahoma City, Okla., commenced operations May 17. **F. K. Buckalow** is superintendent of the plant and **A. B. Curtis,** with headquarters at Dallas, Texas, is district superintendent.

John Hewitt Foundry Company, East Newark, N. J., has purchased the **West Hudson Foundry and Pattern Company, Inc.,** Kearny, N. J. **John Hierwarter,** former president of the Kearny company, now is in charge of the non-ferrous department of the Hewitt company.

Star Electric Motor Company, 134 Miller Street, Newark, N. J., manufacturer of motors, dynamos and kindred electrical equipment, has acquired 3½ acre tract on Riverside Avenue, for a two-story plant totalling about 80,000 sq. ft. floor space, to cost about $150,000 with equipment.

White Way Electric Sign Company, Junction City, Wis., manufacturer of electro-mechanical advertising signs, marquees, canopies, etc., has moved its plant and offices to Marshfield, Wis., quadrupling its capacity. The company recently consolidated with the **Quinn Sign Company,** Fond du Lac.

H. H. Doehler, L. H. Pillion, F. J. Koegler, L. H. Morin, L. B. Kanter, C. O. Miniger, P. V. Schields, Jansen Noyes and **H. A. Nehrbas,** have been elected directors of the **Doehler Die Casting Company,** New York. This firm is considering a new plant unit in Toledo, Ohio, to cost more than $400,000 with machinery.

Oneida Community, Ltd., Oneida, N. Y., manufacturer of silver plated ware, has purchased assets of **William A. Rogers, Ltd.,** including plants at Niagara Falls, N. Y., Toronto, Can., Northampton, Mass., and Wallingford and Hartford, Conn. The new owner will continue all present plants, and plans expansion. **P. B. Noyes** is president of the purchasing company.

Aztec Stove and Foundry Works, 210 Corpus Christi Street, Laredo, Texas, has begun the construction of a foundry building. The company will specialize in the manufacture of cast iron, wood burning stoves for export to Mexico and enameled gas stoves for the trade in the United States. **J. J. Gonzales** is plant superintendent and manager, and **A. Gonzales** is foundry superintendent.

The **Parker Rust-Proof Company,** 2177 E. Milwaukee Avenue, Detroit, Mich., and the **Wolverine Enameling Company,** also of Detroit, have been merged, the name of the Parker Rust-Proof Company being retained. The consolidated company has assets of $1,500,000. The Parker company has developed a new process called "Bondering," a primer base for paint, enamel or lacquer when applied to steel, and the plant and business of the Wolverine company was acquired for the laboratory and experimental work in connection with the application of this process.

New Companies

American Watch Crystal Company, jewelry, care of A. Samuelson, 910 Brook Ave., N. Y., has been incorporated with 10,000 shares common stock.

Nicholl-Hale Chrome Service, Inc., 1837 Garfield Avenue, Detroit, Mich., has been organized to do chrome plating on dies, tools, gages, etc. **P. P. Hale** is vice-president and general manager.

Officials of **Philip Cass and Company,** 40 North Fifth Street, Philadelphia, Pa., manufacturers of electrical equipment and fixtures, have organized the **Philip Cass Company, Inc.,** with capital of $200,000, to take over and expand the present plant and business. **Philip Cass** and **W. R. Donachy** head the new company.

Hamilton-Sangamo Corporation, Lancaster, Pa., has been organized to take over and consolidate the **Hamilton Watch Company,** with plant at Sangamo, and **Sangamo Electric Company,** Springfield, Ill., manufacturer of electric clocks, electric meters, radio parts, etc. It is proposed to remove the Springfield plant to Lancaster, where expansion will be carried out and production concentrated.

Charles B. Bohn, president **Bohn Aluminum and Brass Corporation,** Detroit, Mich., and associates are organizing **Simon Airplane Appliance Company** with capital of 60,000 shares of stock, no par value. The new company will be consolidated with **Heywood Starter Company** of Detroit, manufacturer of high pressure starters for aircraft service. Later, another company will be formed under the name of **Airplane Equipment Company,** capitalized at 200,000 shares of stock, no par value, to take over the last two noted interests and develop facilities for manufacture of airplane equipment and accessories. Mr. Bohn will head the new organization.

Durex Abrasives Corporation, Jersey City, N. J., has been formed under the Webb-Pomerene Act to carry on an export business in abrasives. The company is a combination of abrasives divisions of the following: American Glue Company, Armour and Company, Baeder-Adamson Company, H. H. Barton and Sons Company, Behr-Manning Corporation, The Corborundum Company, Minnesota Mining and Manufacturing Company, United States Sandpaper Company and The Wasau Abrasives Company. A world-wide business in abrasives will be developed, with **D. W. Fernhout,** vice-president, in charge of European sales and **G. A. Bergstrom** in charge of all other foreign sales. The company states that the exports of the concerns in the combine represent about 15% of the total American abrasive paper and cloth production.

Trade Publications

Type FD (4") Pyrometers. Roller-Smith Company, 233 Broadway, New York City.

Pickling Tank Temperature Control. The Weaver Brothers Company, Adrian, Mich.

Houghton on Industrial Plant Lubrication. E. F. Houghton and Company, Philadephia, Pa.

Classifications of Metal Specialties. Industrial Metal Company, Philadelphia, Pa. Interesting list of names and definitions.

Heat Treating 100 Jobs at a Stroke. The Brown Instrument Company, Philadelphia, Pa. Broadside on installation of control instruments.

The Story of New York Today. The Merchants' Association of New York, New York City. Interesting data on America's greatest city.

Arc Welding Data. Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa. Bulletin No. 7, Maintenance by the Electric Arc.

Round Form Recorders. C. J. Tagliabue Manufacturing Company, Brooklyn, N. Y. Broadside on precision indicating, recording and controlling instruments.

Metalayer, the Putting-on Tool. Metals Coating Company of America, Philadelpha, Pa. Leaflet on a tool for spraying molten metals for surfacing and building up.

Hoke, Incorporated, 22 Albany Street, New York City, publications: Hoke-Phoenix Devices for Control of Compressed Gases; Hoke Ammonia Controls; The Hoke Flo-Gage.

Low Pressure Type Rotary Positive Blowers. The P. H. and F. M. Roots Company, Connersville, Indiana. Covers foundry and furnace blowers as well as other. Illustrated booklet.

The Mond Nickel Bulletin. American Mond Nickel Company, Century Building, Pittsburgh, Pa. The May, 1929, issue contains a summary of current information on nickel. Valuable abstracts and references are given.

Roots Covers Industry Like a Blanket. The P. H. and F. M. Roots Company, Connersvlle, Ind. Bulletin 10-B1, catalog of pumps, blowers and other equipment. Also, No. 22-B1 on low pressure blowers with roller bearings; No. 1181, engineering tables.

Nielsen Survey Index—June, 1929. A. C. Nielsen Company, Chicago, Ill. The following surveys, ordinarily offered only to subscribers of the Nielsen company, will be sent free upon request: Hack Saw Blade Sharpener; Magnet Crane for Pig and Scrap Handling. The surveys are made to determine the economy of various types of equipment.

General Electric Company, Schenectady, N. Y., publications: Novalux Floodlight Projectors; Direct Heat Electric Furnaces; Helicoil Sheath-Wire Immersion Heaters; Travel Carriage for Automatic Arc Welders; Two-Stage Reciprocating Air Compressors; Reciprocating Air-Compressor Sets, Two-Stage, Stationary; Continental Gas-Engine Driven Arc Welder; Reciprocating Air-Compressor Sets, Single-Stage, Stationary; Reciprocating Air-Compressor Sets, Single-Stage, Portable.

Metal Prices, June 24, 1929

NEW METALS

Copper: Lake, 18.125. Electrolytic, 18.00. Casting, 17.375.
Zinc: Prime Western, 6.70. Brass Special, 6.80.
Tin: Straits, 44.625. Pig, 99%, 44.125.
Lead: 6.80. **Aluminum,** 24.30. **Antimony,** 8.90.
Nickel: Ingot, 35. Shot, 36. Elec. 35. Pellets, 40.
Quicksilver: flask, 75 lbs., $121. **Bismuth,** $1.70.
Cadmium, 95. **Cobalt,** 97%, $2.60. **Silver,** oz., Troy, 52.25.
Gold: oz., Troy, $20.67. **Platinum,** oz., Troy, $64.00.

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	13½
Brass Ingots, Red	16
Bronze Ingots	17¼
Casting Aluminum Alloys	21 to24
Manganese Bronze Castings	28 to40
Manganese Bronze Ingots	16 to21
Manganese Bronze Forgings	36 to44
Manganese Copper, 30%	30 to40
Monel Metal Shot	28
Monel Metal Blocks	28
Parsons Manganese Bronze Ingots	16½to19¾
Phosphor Bronze	19 to22
Phosphor Copper, guaranteed 15%	22½to25
Phosphor Copper, guaranteed 10%	21½to24
Phosphor Tin, no guarantee	55 to70
Silicon Copper, 10%.....according to quantity	30 to35

OLD METALS

Buying Prices		Selling Prices
16½to16¾	Heavy Cut Copper	17½to17¾
14½to14¾	Copper Wire, mixed	15½to15¾
11¾to12	Light Copper	12¾to13
13 to13¼	Heavy Machine Composition	14 to14¼
9 to 9½	Heavy Brass	10 to10½
7 to 7½	Light Brass	8 to 8½
9¾to10¼	No. 1 Yellow Brass Turnings	10¾to11¼
12¼to12½	No. 1 Composition Turnings	13¼to13½
5¼to 5½	Heavy Lead	6 to 6½
3½to 3¾	Zinc Scrap	4¾to 5¼
8 to10	Scrap Aluminum Turnings	12½to14¼
13 to13½	Scrap Aluminum, cast alloyed	17½to18½
19 to20	Scrap Aluminum sheet (new)	22 to22½
30½to32	No. 1 Pewter	35 to38
20 to21	Old Nickel Anodes	22 to23
20 to23	Old Nickel	22 to25

Wrought Metals and Alloys

COPPER SHEET

Mill shipment (hot rolled) .....27¾ to 28¾c. net base
From Stock .....28¾ to 29¾c. net base

BARE COPPER WIRE

19⅝c. to 19⅞c. net base, in carload lots.

COPPER SEAMLESS TUBING

29¼c. to 30¼c. .net base.

SOLDERING COPPERS

300 lbs. and over in one order .....26¼c. net base
100 lbs. to 200 lbs. in one order .....26¾c. net base

ZINC SHEET

Duty sheet, 2c. per lb.	Cents per lb.
Carload lots, standard sizes and gauges, at mill, less 7 per cent discount	10.25 net base
Casks, jobbers' price	10.50 net base
Open casks, jobbers' price	11.00-11.50 net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base, ton lots, per lb. 33.30
Aluminum coils, 24 ga., base, price 31.00

ROLLED NICKEL SHEET AND ROD

Net Base Prices

Cold Drawn Rods	53c.	Cold Rolled Sheet	60c.
Hot Rolled Rods	45c.	Full Finished Sheet	52c.

BLOCK TIN SHEET

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 10½c. over Pig Tin; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 17c. over; less than 25 lbs., 25c. over.

SILVER SHEET

Rolled sterling silver 54½c. to 56½c. per ounce, Troy.

BRASS MATERIAL—MILL SHIPMENTS

In effect April 16, 1929.
To customers who buy 5,000 lbs. or more in one order.

	Net base per lb. High Brass	Low Brass	Bronze
Sheet	$0.23¼	$0.25	$0.26¼
Wire	.23¾	.25½	.26¾
Rod	.21¼	.25¾	.27
Brazed tubing	.30⅞	....	.35⅞
Open seam tubing	.31¼	....	.34¼
Angles and channels	.31¼	....	.34¼

BRASS SEAMLESS TUBING

28¼c. to 29¼c. net base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	.25¾c. net base
Muntz or Yellow Metal Sheathing (14"x48")	.24c. net base
Muntz or Yellow Rectangular sheet other Sheathing	.25c. net base
Muntz or Yellow Metal Rod	.22¼c. net base

Above are for 100 lbs. or more in one order.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Sheet Metal		Wire and Rod	
10% Quality	31⅜c.	10% Quality	34⅛c.
15% Quality	33c.	15% Quality	37¾c.
18% Quality	34¼c.	18% Quality	41c.

MONEL METAL SHEET AND ROD

Hot Rolled Rods (base)	35	Full Finished Sheets (base)	42
Cold Drawn Rods (base)	40	Cold Rolled Sheets (base)	50

BRITANNIA METAL SHEET

No. 1 Britannia—18" wide or less, No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin. price; 100 lbs. to 500 lbs., 10c. over; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 20c. over; less than 25 lbs., 25c. over. Prices f. o. b. mill.

Supply Prices, June 24, 1929

ANODES

Copper: Cast	28c.	per lb.
Rolled, oval	27c.	per lb.
Rolled, sheets, trimmed	27¾c.	per lb.
Brass: Cast	27c.	per lb.
Zinc: Cast	12½c.	per lb.

Nickel: 90-92%	45c.	per lb.
95-97%	47c.	per lb.
99%	49c.	per lb.

Silver: Rolled silver anodes .999 fine are quoted from 56 to 58c., Troy ounce, depending upon quantity.

FELT POLISHING WHEELS WHITE SPANISH

Diameter	Thickness	Under 100 lbs.	100 to 200 lbs.	Over 200 lbs.
10-12-14 & 16"	1" to 3"	$3.00/lb.	$2.75/lb.	$2.65/lb.
6-8 & over 16	1 to 3	3.10	2.85	2.75
6 to 24	Under ½	4.25	4.00	3.90
6 to 24	½ to 1	4.00	3.75	3.65
6 to 24	Over 3	3.40	3.15	3.05
4 up to 6	¼ to 3	4.85	4.85	4.85
4 up to 6	Over 3	5.25	5.25	5.25
Under 4	¼ to 3	5.45	5.45	5.45
Under 4	Over 3	5.85	5.85	5.85

Grey Mexican Wheel deduct 10c per lb. from White Spanish prices

COTTON BUFFS

Full Disc Open buffs, per 100 sections.

12" 20 ply 64/68 Unbleached	$28.10 to 28.95
14" 20 ply 64/68 Unbleached	37.30 to 40.44
12" 20 ply 80/92 Unbleached	31.50 to 24.16
14" 20 ply 80/92 Unbleached	42.85 to 46.09
12" 20 ply 84/92 Unbleached	40.80 to 42.50
14" 20 ply 84/92 Unbleached	54.60 to 57.43
12" 20 ply 80/84 Unbleached	37.40 to 39.37
14" 20 ply 80/84 Unbleached	50.45 to 53.12

Sewed Pieced Buffs, per lb., bleached ..... 40c to 71c

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.14-.19
Acid—Boric (Boracic) Crystals	lb.	.08½
Chromic 100 and 400 lb. drums	lb.	.19½
Hydrochloric (Muriatic) Tech., 20°, Carboys	lb.	.02
Hydrochloric, C. P., 20 deg., carboys	lb.	.06
Hydrofluoric, 30% bbls.	lb.	.08
Nitric, 36 deg., carboys	lb.	.06
Nitric, 42 deg., carboys	lb.	.07
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl	lb.	.16¾-.21¼
Denatured, drums	gal.	.48-.58
Alum—Lump, Barrels	lb.	.03¼
Powdered, Barrels	lb.	.039
Aluminum sulphate, commercial tech	lb.	3.3
Aluminum chloride solution in carboys	lb.	.06½
Ammonium—Sulphate, tech., bbls.	lb.	3.3
Sulphocyanide	lb.	.65
Arsenic, white, kegs	lb.	.05
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Borax Crystals (Sodium Biborate), bbls	lb.	.04½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls.	lb.	.25
Chromic Sulphate	lb.	.30
Copper—Acetate (Verdigris)	lb.	.23
Carbonate, bbls.	lb.	.21½
Cyanide (100 lb. kegs)	lb.	.50
Sulphate, bbls.	lb.	6.7
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$70.00
Fusel Oil	gal.	$4.45
Gold Chloride	oz.	$12.00
Gum—Sandarac	lb.	.26
Shellac	lb.	.59-.61
Iron Sulphate (Copperas), bbl.	lb.	.01½
Lead Acetate (Sugar of Lead)	lb.	.13¼
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Nickel—Carbonate, dry, bbls.	lb.	.35
Chloride, bbls.	lb.	.20
Salts, single, 300 lb. bbls.	lb.	.13
Salts, double, 425 lb. bbls.	lb.	.13
Paraffin	lb.	.05-.06
Phosphorus——Duty free, according to quantity	lb.	.35-.40
Potash, Caustic Electrolytic 88-92% broken, drums	lb.	.09
Potassium Bichromate, casks (crystals)	lb.	.09¼
Carbonate, 96-98%	lb.	.06¾-.07
Cyanide, 165 lb. cases, 94-96%	lb.	.57½
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.05½
Silver Chloride, dry, 100 oz. lots	oz.	.42¾
Cyanide (fluctuating)	oz.	.53-.56
Nitrate, 100 ounce lots	oz.	.37
Soda Ash, 58%, bbls.	lb.	.02½
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.18
Hyposulphite, kegs	lb.	.04
Nitrate, tech., bbls.	lb.	.04¾
Phosphate, tech., bbls.	lb.	.03¾
Silicate (Water Glass), bbls.	lb.	.02
Sulpho Cyanide	lb.	.32½
Sulphur (Brimstone), bbls.	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.35½
Tripoli, Powdered	lb.	.03
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc Carbonate, bbls.	lb.	.11
Chloride, casks	lb.	.06¾
Cyanide (100 lb. kegs)	lb.	.41
Sulphate, bbls.	lb.	.03¾